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The Philosophical and Social Framework of Education

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EDITOR'S NOTE

Regular readers of the REVIEW will observe in this issue two departures from our heretofore established practice. A list of "Additional References" has been appended to several of the chapters, and the bibliographical references are unnumbered.

The REVIEW has always attempted to be selective of the most important of the research literature, but the continually accelerating pace of research and publication has put increased pressure on our contributors to keep within the bounds of allotted space. If the REVIEW is to avoid becoming a mere listing of references, some means of relieving such pressure is required. Accordingly, the list of additional references includes articles which are relevant but whose degree of importance does not demand discussion in the text. The space thus made available permits adequate discussion of the important writings, and these are listed under the heading "Bibliography."

Reference to the bibliography by means of numbers has long been a potential source of error as well as a considerable burden to the contributors and the editorial staff. For this and other reasons, the decision has been made to use, instead, the year date at the first mention of an entry. It is believed that means used to distinguish references where possible ambiguity might exist are adequate. Readers are invited to point out instances where this appears not to be true.

This issue of the REVIEW was prepared by the Committee
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INTRODUCTION

This number of the REVIEW, ninth in the cycle of issues on "The Philosophical and Social Framework of Education," shows both discontinuity and continuity with its predecessors. Its continuity stems from a conviction shared by this committee with its predecessors that intimate and inextricable interrelationships exist between the pursuits of education and the society and culture which environ these pursuits. Edwards articulated this conviction in the 1949 REVIEW devoted to this area of educational studies. He indicated that education is not some discrete activity carried on outside the community of ideas and values of an age; it is never an autonomous process divorced from the community it serves; it always operates within a given social framework and finds its central purposes, its guiding principles, and ultimate goals in the particular social order within which it develops and functions.

The discontinuity reflects changes in the orientation, emphasis, and methodology of the scholarly and research disciplines concerned with the study of man in society and culture, particularly as these changes have impinged upon studies of education. In turn, the changes themselves clearly reflect the changed demands on educational scholarship and opportunities for educational scholarship that are presented by the social order—or, more accurately, the social disorder—within which educational pursuits are planned, undertaken, and evaluated today.

This issue follows more closely the lines of *academic* disciplines concerned with the study of man in society and culture than previous issues have done. This fact reflects movement toward the meeting and merging of *academic* and *professional* disciplines in the study of man and society in their educational aspect. Such meeting and merging are being facilitated both by growing academic sophistication among professional students of education and by growing concern with educationally relevant problems among academic students of man and society. Such development is most evident in the philosophy, sociology, and anthropology of education, and perhaps least evident in the history of education, as Chapter I suggests.

The unprecedented demands for reorientation which American leadership and responsibility in the international field have thrust upon the traditionally provincial cast of American educational studies are reflected here. Although the effects of these demands are evident in some measure in the more traditional foundational disciplines, they are most evident in the emerging disciplines of educational anthropology and comparative education where a cross-cultural emphasis is inherent in the approach to problems. Brameld and Rapacz were asked originally to prepare a single chapter on these two disciplines. They were able to convince the chairman that two chapters were required. Since these are "new" chapters in the

cycle, their authors have been absolved from limiting their bibliographies to materials published during the last three years.

The burden of giving substance to the concept the chairman suggested originally for this issue has fallen on the contributors. The chairman thanks them for their signal contributions to the REVIEW and to educational research and scholarship.

KENNETH D. BENNE, *Chairman*
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and Social Framework of Education

CHAPTER I

History of Education

BERNARD MEHL

IN THIS REVIEW certain terms appear which need to be clarified beforehand. *History of education* at times is used to signify the entire range of historical writings about education. At other times it is used to denote historical writings about education by professional educators. And lastly it is applied to those historical writings about education by professional educators who specialize in educational theory. This last group can be divided into those scholars whose primary discipline is history and those who are primarily educational philosophers, social theorists, and the like. Inasmuch as labeling the various usages of the term "history of education 1," "history of education 2," and "history of education 3" would be confusing, the reader is left to derive the particular sense of the term's meaning from the context.

A distinction is also made between the academic educational historian and the professional educational historian. No value judgment is implied. An additional distinction is made between the related concepts, *the new history* and *pragmatic history*, the difference being that the new history stems from the academic tradition whereas pragmatic history is a term that applies rather to the work of the professional educational historian.

In the main, this review regards the literature in the history of education as illustrative of the place history holds in shaping educational means and ends. Initially the major theoretical emphases in the field are critically analyzed in terms of trends in current writings. This analysis is followed by an assessment of the difficulties facing the historian of education because of the new movements in theory. Finally, an effort is made to point up some of the areas of concern in which intensive historical study would be particularly fruitful.

Historiography of History of Education

Reporting developments in the history of education in a review of educational research calls to mind the question of the nature of history and its relation to research. Since the term *research* carries connotations of *objective*, *predictive*, *scientific*, and *controlled*, how can one talk about history of education that is nonobjective, incapable of accurate measurement, nonpredictive, unscientific, and definitely not controlled, as being research? This question implies a view that is not descriptive of a necessary state of affairs but rather indicative of one peculiar concept of research. And this concept of research—wedded to a scientific framework,

which many take to be devoid of the sentimental, intuitive, poetic dimension of the humanistic pursuits—is seen to be our salvation from the most crucial of our educational ills. On the other hand, we are reminded by a number of outstanding social scientists and social critics that narrowing the concept of research has robbed it of its power. History of education, in this latter view, has a definite relation to research.

The Functional Role of History of Education

Mills (1959) stated: "No social study that does not come back to the problems of biography, of history, and of their intersections within a society has completed its intellectual journey." For Mills, the sociologist who embarks on this journey is possessed of what he termed the "sociological imagination," and it may be that the educational researcher who does the same can be said to display *educational imagination*. A similar view was advanced by Anderson (1956) in his discussion of the functional role of the history of education. Anderson stated that functionality is not to be confused with practicality, even though functionality does entail a contribution to "intelligent action." However, intelligent action was seen by him to rest in the area of policy decision, on educational ends as well as means. On this point Anderson seemed to be in agreement with Durkheim (1956) in asserting that "only the history of education and of pedagogy allows for the determination of the ends. . . ." By Mills the "historical sense" was seen to be a necessary factor in any kind of research which seeks to establish policy decisions or which attempts to find answers to the "big questions." Yet when answers to little questions are shunned, a condition comes to exist similar to that caused by the split between pure and applied research—a split between *policy* historians and *practical* historians. Both are needed.

Historical Validation of Educational Practices

Work is being done by historians of education on matters pertaining to educational practices. These efforts form as much a part of the historiography of history of education as the attempt to illuminate and guide policy. This form of historical pursuit is founded on a view of history which holds that objectivity can be maintained by the historian and that descriptions of past practices can be analyzed and evaluated to yield positive conclusions concerning their validity. Adherents of this view assert that many educational-policy statements are promoted by a hidden assumption which holds that the historical facts purported to lend support to them are inevitably valid assertions. Many statements advanced in support of educational policies relating to discipline, control, learning, and teaching carry with them value assertions that bear what we can call the historical temper but are never articulated.

Smith (1960), in trying to obtain a value-free definition of teaching, recognized the biases contained in the definitions commonly offered. It

is these definitions that underlie many experiments in teaching methods. Smith concluded that educational experimentation is on dead center because the experimenters are out to reaffirm particular biases. He stated: "If we cut through the verbal curtain and look at actual instructional operations in the classroom, we find them to be different from what our linguistic commitments lead us to believe. We see that teachers do many things which cannot be neatly fitted into the traditional theories of pedagogy." For Smith, value-free statements of practice are to be stripped of policy connotations. But, for this to be accomplished, the facts of the case must be established free from linguistic bias. Now, if one asserts that the establishment of things as they are immediately involves the asserter as much in a historical as in a sociological, psychological, or linguistic quest, then a re-emergence of a type of historical undertaking that has long been forgotten by many educators can be established, namely, the verification of past educational facts.

Current Emphases on a Pragmatic Philosophy of History

Functionality is probably the pattern of the historiography of the history of education accepted by most present-day professional historians of education—though functionality itself constitutes only one of many ways of engaging the effort of historians of education. When a commitment to functionality is made, the historian adheres to a particular philosophy of history and excludes others. Therefore, understanding the work of a historian of education includes the necessity of bringing under scrutiny the kind of philosophy evident or implicit in the historian's undertaking, for the kind of history he is writing shows the influence of that philosophy in one way or another.

In recent writings in the history of education most authors adhere to a philosophy of history tied more or less closely to pragmatism. Pragmatic historical writing has two aspects. The first aspect is characterized by an effort to prove that many specific proposals of progressive education are in step with history. An offshoot of this school seeks to justify the validity of the pragmatic temper by showing that this temper is in keeping with the American pattern. Boorstin (1958), an academic historian, believed a case can be made that the pragmatic attitude was operating during colonial days and predated by many years the efforts of such heroes of pragmatism as Franklin and Jefferson. Boorstin added historical evidence to Lerner's thesis (1957) that a unique conception of American civilization does indeed exist and that this conception coincides with many of the attributes of philosophical pragmatism.

The similarity in outlook found between John Dewey and Horace Mann by Anderson (1960) in an issue of *Educational Theory* commemorating the centennial dates of Mann's death and Dewey's birth implied that Dewey's thought is an extension of an authentic tradition. Rogers (1959)

reaffirmed that pragmatism is the philosophy of America. Childs (1959), in a continuation of his thesis that Dewey's pragmatism represents the true spirit of the American temper, stated: "Dewey eventually emerged as one of the foremost interpreters of American life and thought." The child-centered wing of progressive education also enlisted history on its side when Stiem (1960) found concern for the child in the writings and actions of Bronson Alcott.

Thut (1959) reiterated his stand that authoritarianism in almost any form runs contrary to the American way of life: "The history of the Connecticut Colony lays a strong foundation for identifying the state with the people." Tracing the actions of the Connecticut legislature, Thut concluded that control of education lies, not with the states, but with the people.

Another offshoot of educational historical writing dedicated to the historical clarification of the pragmatic temper carries the theme that progressive education is a never-ending revolutionary movement (yet containing the major fundamental traditions of the American dream) constantly at war with the forces of reaction and conservatism. Rippa (1958) bared the plot behind the attack of the National Association of Manufacturers upon social-science textbooks in 1940: business leaders, he showed, were "spending time and large sums of money . . . to perpetuate the idea that 'free enterprise is the American way of life'."

The boon brought about by progressive education was to Brubacher (1960) realizable only after a false view of the child had been overcome: "While formerly children were to be seen and not heard . . . they have increasingly come to be heard as well." Cremin (1959), in a more careful and judicious appraisal of progressive education, tied it to the general progressive movement in American history, along with populism, Theodore Roosevelt's Square Deal, and Wilson's New Freedom. When these movements gave way to conservative forces in times of postwar jitters and increased prosperity in material goods, progressive education fell from the pinnacle which it had reached in the 1920's and 1930's: (a) success brought schisms between child-centered and society-centered ways; (b) the progressives knew what they were against but had little to offer as a substitute; (c) the original ideas were translated into shibboleths, clichés, and platitudes; (d) the movement became a victim of a general swing to conservatism after World War II; and (e) the increasing technological revolution created a demand for more, rather than less, formalism. Handlin (1959) portrayed Dewey as a critic of an outmoded educational system and, like Cremin, linked him with the social reform movement at the end of the nineteenth century.

Another branch of this pragmatic approach to history (pragmatic in the sense of clarifying or defending pragmatism) challenged the critics of both progressive education and John Dewey. The literature on this topic represented more the polemicist's use of history than the scholar's and cannot be viewed as serious intellectual endeavor. However, the serious

historian of education can note the tendency of critics of progressive education also to function as polemicists and fashion history into a vehicle to justify their attacks on progressive education. Aside from the polemics of the progressive-traditional controversy, several serious historical studies on such topics as religion in education and curricular practices were published, including those of Dunn (1958) and Latimer (1958).

Thus far we have been describing that aspect of pragmatic history of education which justifies a philosophical and methodological outlook either by finding its bearings in tradition (a variation of biblical historiography) or by viewing the pragmatic temper as a set of ideas victorious after an evolutionary conflict with prior outmoded beliefs. (Dewey himself was wont to see the history of ideas in this manner.)

The second aspect of pragmatic history of education is characterized by the way pragmatically oriented historians of education address themselves to the facts and events of history: what they choose to study, what they consider as evidence, their historical sensitivity, and what they see as the limits and function of history.

Berkson (1958), in his critique of experimentalism, charged that Dewey's followers underemphasize the role of "history and the cultural heritage as the source of values." Berkson singled out Kilpatrick as the outstanding experimentalist who tended "to associate the past with statism, authoritarianism, and dogmatism." To a certain extent Berkson has managed to reveal one kind of educational history engaged in by pragmatically oriented educational historians. That's *Story of Education* (1957) represents the best example of the genre on which Berkson commented. Antagonism to the past is also to be found in many educational articles purporting to defend progressive education against an enemy represented as part of a dead past. But, as Berkson has pointed out, the experimentalist view of history is not necessarily directed by this anti-historical bias.

Dworkin (1959), in his introductory essay on Dewey, made a refreshing appraisal of the historical roots of Dewey's thought, avoiding the easy division of education into new and old and also avoiding the easy identification of the new with good and the old with evil. Zeitlin (1958) called for fair treatment of the problems besetting American education and asserted that educational affairs are too complex for simple analysis.

One of the better analyses of the pragmatic theory of history appeared in a re-issue of White's *Social Thought in America* (1957). History, as conceived by the "new historians," White stated, "can contribute to our understanding and to the explanation of the present." The new history, according to White, consistently subordinates the past to the present. Pragmatic historians of education also tended to hold that historical institutions, figures, and ideas are fashioned by the needs of a society, standing as the instruments hammered out on the forge of social experience. The social school, Zeitlin (1958) said, "follows the values of society." That social unity and not intelligence is the aim of the common-school movement in

the United States was observed by Eschenbacher (1960) and also by Mehl (1958). These two authors saw the success of the common-school movement as due to a view of the school as a vehicle for social cohesion held by those forces in society that were politically and financially able to bring it into being rather than to any innate American love for an educated populace. According to Boorstin (1958), the American college "became a place concerned more with the diffusion than the advancement or perpetuation of learning."

Harlan (1958), in a careful study of the origins of the segregated school system, saw the segregated school as an instrument to disfranchise Negroes but not "poor whites." The Southern school system, Harlan concluded, was never given full public support, and Southerners never had a fundamental attachment to the cause of public education.

Curti (1959) contributed further insight into the method of the new historian of education by pointing out "the dominant trends and minor eddies in the American economy and society and the influences these shifting forces had on the social thinking of educational leaders." Since for Curti these were "shifting forces," he saw the historian of educational history since 1930 as focusing on "three major movements of thought." The first was the increasing emphasis on science and technology; the second reflected the influence of neo-Marxism and its effect on judgment concerning social reform here and abroad; and the third was prompted by the sudden and dramatic exploits of the Soviet Union in science and technology. The new historians, Curti concluded, saw their kind of history as a force for beneficial social change in step with the future rather than with a conservative past. Curti indicated that one of the educational consequences of the conservative mood of postwar America "has been the retreat of the idea that the school can and should take the lead in initiating and implementing social reform."

Some Problems of the Pragmatic Historian of Education

The ferment in historical thought as applied to education brought on by proponents of the new history cannot be denied. They infused the old history of education with a fresh approach, abandoning the detailed and factual accounts of programs and practices which formed the core of the old history. The new history was *functional* in focusing on the practical concerns of school policies and larger social issues. It supported the reforming element of school leadership and prodded the keepers of the *status quo*. As long as the new history remained an instrument for social criticism, it retained its dynamic nature. But when it had to be turned into an instrument to defend a definite educational outlook, an outlook which paradoxically gave the new history its *raison d'être*, it adopted the time-honored means of historical defense by seeking to provide a tradition for a tradition-attacking point of view.

The object now seems to be finding answers to such questions as, What is the real tradition? Who upheld it? and Who broke it? Such an approach is far different from the one which searched for the reasons why traditions are unstable and for insights into those trends that would help to solve problems. Boorstin (1958) is a pragmatically oriented historian trying to establish a tradition. On the other side, such studies have appeared as that by Dunn (1958), who maintained that the American outlook on religion and education favors the Catholic position that the school is to be religious but not sectarian and that the "moderns" have created a secular school with its own brand of religion; and that by Latimer (1958), who examined the secondary-school movement at the end of the nineteenth century and concluded that the basic disciplines had been firmly adopted by the high school as a solid pattern of secondary education for all American youth.

An additional source of trouble for the new history of education lies in the same turn of events which changed the educational historian into a defender of a faith. The discernment of trends and the determination of social forces called for a somewhat different kind of historical research than that necessary to verify a tradition, and so the new historian drew his methodological models from anthropology, sociology, psychology, and political theory, which he then used to study the social milieu.

Sooner or later the establisher of traditions must come to grips, not with trends or directions, but with objective fact. He in effect is forced to hold to the historical objectivity of a set of ideas. This methodological problem is specifically apparent in the following examples. A new educational historian, French (1957), saw the Kalamazoo decision as a crucial one in favor of Jacksonianism over a conservative *status quo*. That decision, irrespective of its historical context, was seen as meaningful within a larger social context, which is in a sense above history. It mattered not what the specific incident being adjudicated was nor what issues were at stake in the controversy. The Jacksonian concept was applied and was found fitting regardless of who won the immediate case.

The same kind of approach was used by the new historians in explaining that the Fourteenth Amendment was a victory for the merchants of capital against popular demands for a fair share of the national wealth, even though it was ostensibly aimed at protecting the rights of emancipated slaves. There is nothing inherently wrong with this method of opening up the shifting patterns of historical events. What seems evident is that it is one thing to proclaim that a certain move was advantageous to one social group and detrimental to another, whereas it is something else to force the conclusion that what was advantageous to one social group or detrimental to another constituted the essence of the American tradition.

An authentic tradition is not discovered when the search for it is directed by present biases of the historian. Because of such biases the new historian, at first, refused to recognize the term *tradition*, just as his philosophical counterpart rejected the term *metaphysics*. Traditions are dis-

covered by objectively studying in detail separate historical events over a long period of time and applying a historical calculus. (The new historian would object to this statement on the grounds that objectivity in history, like neutrality in science, is a fiction.) Duration and quantity are the measuring rods of tradition. A historical realism supplants historical pragmatism. To return to the terminology of White (1957), the new historian, when he engages in the tradition-making business, has retreated from his revolt against formalism.

Without judging the merits of the effort to establish a traditional base for progressive education, it can be noted that within the history of education few indeed have either the will or the training to engage in formal historical analysis.

Before leaving this discussion, it may be well to take note of a strange shift in historical writing. Adler and Mayer (1958) continued in the path of the new historians of education fighting against traditions and argued that American education must find educational and philosophical solutions in a traditionless society. By arguing thus, Adler and Mayer assumed that the experimentalists' theory of education is not history's answer to the present problems of a complex society. Donohue (1959), examining the Marxian, Deweyan, and Christian doctrines of work, found the first two inadequate, not in terms of tradition, but in terms of their relevance to the present problems of man's alienation brought about by the specialized and atomized nature of contemporary employment. Kneller (1958), in this same vein, justified a concern for existentialism. Yet, on the whole, the concern for existentialism reflected in the writings of theologians and social commentators led by Reinhold Niebuhr, Paul Tillich, Erich Fromm, and C. Wright Mills has not found its way significantly into the history of education.

The major concern of recent writings in educational history has been with such current political and social problems as educational opportunity, educational control, and educational policy; but the educational historian has limited his endeavors to a resolution of problems which have been raised to the level of issues, and disregarded *troubles*. Troubles, according to Mills (1959), "occur within the character of the individual and within the range of his immediate relations with others." Concern for troubles asks for a history that becomes conscious not only of decrees, policies, political actions, manifestoes, committee reports, social theory, and ideological patterns but also of the biography of the student and the teacher, who often are actors unconsciously struggling with and against issues not of their own making.

Recent Movements in the History of Education

The history of education, like other academic fields, is conscious of contemporary events. One then should find that the output of educational

historians is in pace with present-day controversies and concerns, and it is true that the larger the issue in terms of the attention given to it by the mass media, the larger has been the effort by historians of education to explore that issue. Historians have been active on one side and the other in the debates on educational policy arising out of Soviet scientific achievement. In the main, however, the educational historian has championed the cause of modern education against *critics of education*.

Bayles (1960), defending Dewey's doctrine against misinterpretation, implied that Dewey has been maligned and is being held up as the symbol of "permissiveness" and "practicality" by conservative forces in the United States. Hullfish (1960) joined Bayles and showed that Dewey was misinterpreted by the very teachers who were his most ardent followers. Hullfish maintained that "the progressive movement has been supported by many whose views do not agree with those of Mr. Dewey."

Harlan pointed up the continuing interest in the integration issue but, strange as it may seem, analyses of this issue in the years 1957-60 were not to be found in journals devoted to educational theory; a glance at the *Education Index* showed a paucity of writings by educational theorists concerning the whole question of integration. Lieberman (1957) traced the recent views and actions of the National Education Association in regard to civil rights and found them wanting. Bereday (1958) provided a brief historical commentary on the Supreme Court decision on integration. Yet, important as this issue is in the evolution of our public schools, there seems not to exist a comprehensive study of its growth and meaning by an outstanding professional educational historian. Among the doctoral dissertations in education for the years 1957-60 there were but two dealing with the historical dimensions of the issue.

Reflecting the current interest in higher education, Brubacher and Rudy (1958) traced the history of higher education in America from 1636 to 1956. The association of an academic with an educational historian in this venture may indicate a new trend. It may serve to show that the professional historian of education has only recently arrived on the scene of higher education, which has heretofore been the domain of the academic historian. In the past, the professional educational historian's main focus has been on the evolution of the public schools, but with increased college enrollment he can be expected to view higher education as the last chapter in the rise of the public school. Along with the democratization of colleges and universities there may come a jurisdictional struggle over who shall become the recorder of the new movement.

The Status of History of Education

This writer has assumed that history of education occupies a central and unique niche within the wider field of educational studies. The facts, however, seem not to support such a judgment. Most writers on history of ed-

education, even among those connected with professional education, are not trained historians. They often base their writings on historical judgments which they have taken to be finally and irrevocably established. Quoting secondary sources, professional educators have shunned historical research and accepted historical pronouncements. The judgment to be made after a perusal of the educational literature is that there exists a general diffusion of historical effort in the educational profession. *Histories* of secondary education are to be found in textbooks on the core curriculum, and *histories* of elementary education are to be found in textbooks on the self-contained classroom. There are *histories* of industrial arts, speech therapy, audio-visual aids, and guidance. *History* frequently serves as the educational status-maker.

Using history to establish status constitutes an abuse of history; it robs history of its critical function and leads to reduction in rigor and accuracy. History of education wedded to wish-fulfillment on the part of program promoters loses sight of history's tragic function. It becomes the province of publicists rather than of serious scholars. It is no wonder, then, that when a fresh evaluation of the educational past is being undertaken, writers find their material outside the usual histories of education. Eschenbacher (1960), exploring the idea that the common-school movement was a countermove by conservative forces battling the forces of Jacksonianism, did not mention one recent professional historian of education. Boorstin's study of Colonial education (1958), showing the pragmatic temper of Puritanism, included only sources outside the professional history of education. Marrou's excellent treatment of education in antiquity (1956) pointed up the fact that history of education in Europe has maintained its critical and scholarly function without losing vigor.

In the United States there are signs that a revitalization of history of education as genuine history may be forthcoming. Cremin's series of educational classics (1957) has met with critical approval. Paperback reissues of outstanding histories have brought students to realize that serious and well-written accounts of crucial events escape many clichés of educational jargon. Myers's attempt (1960) to bring to history of education the world view of Toynbee added to the dimensions necessary for historical dialogue. Borrowman's excellent treatment of history of education (1960) in the *Encyclopedia of Educational Research* was another example of works which may be ushering in a new interest in history of education.

Some Suggested Areas of Concern

Taking a cue from academic historians, professional historians of education can find a wealth of relevant material in the study of the nonschool educational agencies and their influence on the behavior of modern man both here and abroad. Newspapers, popular journals, novels, drama, radio, and television offer valuable material for the educational historian. They

can be explored to yield clues about what the image of child, school, or teacher has been throughout the years.

Anthropologists have long depended upon historians to provide information about and insights into tribal, national, and regional character; but historians of education have opportunity to become anthropologists of the past themselves simply because the school serves as the container of the projected national character.

More specifically, investigation is needed into the issues of academic freedom. Particularly on the lower educational levels such study is long overdue. The dropout question, long an area for psychological and sociological investigation, has been neglected by educational historians. There is evidence to suggest that curriculum arrangement is not the sole answer.

The relation between political patterns and educational patterns invites investigation. For example, following the lead of Goldman (1956), who was concerned with the history of progressive political thought and action in the United States, the varied patterns of progressive education can be studied in light of the major strands of shifting thought to be found in the broad political meanings of progressivism.

Studies can be made of shifts in educational leadership, if such shifts are to be found. Such questions as, Who occupied administrative positions in the schools? What were their common or separate outlooks? What classes in society did they represent? Has the change from an agrarian to an urban society affected the selection of educational administrators?—these questions are open to intensive historical investigation. Finally, historians of education can enter the lists alongside analytic philosophers to help in the purgation, as McCaul (1958) put it, of "vague and confusing concepts we habitually use in education." It is worth noting that, in the matter of discipline, Milor's account (1958) of a rural schoolteacher in the 1890's implies that cultural reinforcement, not pseudo-psychology, won out. A collection of report cards made by Sutton for the Educational Archives at the Ohio State University yielded evidence to indicate that even in the 1860's cruelty and laissez-faire doctrine were not the order of the day. The old-fashioned teacher may not have been the ogre depicted by the purveyors of more recent concepts of interest, growth, and needs. School compositions, debate topics, journals, reminiscences of teachers and students, and newspaper accounts constitute the primary sources which, while forming indispensable raw material, have too often gone unevaluated by the historian of education. These sources may yield insights which can indeed be used to combat those who seek to advance partisan positions by erecting straw men and straw ideas out of an imagined past.

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CHAPTER II

Philosophy of Education

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SELECTING CURRENT research in philosophy of education is necessarily arbitrary. A set of ground rules has been followed in making the selection for this review. First, only materials commonly recognized as contributing directly to the discipline of philosophy of education have been included. Though many writings of significance to philosophers of education have appeared in the fields of philosophy, of cultural movements, and of educational theory, the mass of such materials makes their inclusion impracticable. The number of inquiries of high quality in philosophy of education has recommended that the review be limited to them.

Second, writings in philosophy of education which have a quality of research and inquiry have been selected, not laudatory or exhortative writings or writings prepared primarily as instructional material. In the period covered by this review many papers celebrating the centennial of John Dewey have appeared, and an effort has been made to select those which open avenues of inquiry or express the significance of the Dewey tradition in a unique way.

Third, attention has been given to the writings of the younger scholars in philosophy of education, particularly those who have recently completed doctoral theses. Of the fifty or sixty dissertations in philosophy of education that appear each year, some of high quality have been selected for review. Some are selected primarily because they indicate the range of concerns accepted for study by the younger scholars in the field.

A fourth factor in selection has been the reviewer's efforts to identify certain broad tendencies in philosophy of education. It seems clear that the analytic movement in philosophy has continued to have considerable impact on philosophy of education. Although it is somewhat tenuous as a movement, studies with a focus in *conceptual analysis* have also been noticed. Many of these are basically influenced by analytic philosophy. But since some analysis of fundamental concepts stems primarily from other philosophical orientations, the use of the term *conceptual analysis* is intended to convey a broader meaning of analysis than is indicated by *the analytic movement in philosophy*. Moreover, these studies are seen to focus on the clarification and development of substantive concepts in the study of education, not primarily on the use of linguistic-logical tools to produce precision of meaning.

This chapter is also designed to show the nature and extent of a philosophic concern with the methods and products of the behavioral sciences. The widely varied movements of thought indicated by existentialism are also seen as impinging, within limits, upon philosophy of education today.

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This review is also designed to show the nature and extent of the concern of philosophers of education with basic problems and issues of public and educational policy. It is intended to give samples of the kind of philosophic treatment given policy questions.

A section heading calling attention to the appraisals and criticisms of philosophies of education in their systematic character may impress the reader as a catch-all for other inquiries in the discipline.

Despite its inclusiveness, some substantial contributions in philosophy of education are not subsumed within the categories guiding this review. A few of these, exemplifying the range of concern of the discipline, are indicated in the concluding remarks of the chapter.

The Analytic Movement in Philosophy of Education

In recent years analytic philosophy has had considerable impact on educational thought. Scheffler (1958b) offered a carefully selected collection of writings designed to reveal the nature and range of this movement. Rather than presenting a system of thought, he discussed what philosophers do when they are concerned with clarity and precision of thought. The editor's introductory and interpretive statements are particularly helpful in clarifying the various methods of analysis exemplified by the authors. In a later study, Scheffler (1960) analyzed three kinds of educational statements, definitions, slogans, and metaphors, in an effort to propose strategies and distinctions for evaluating them critically. He also distinguished in detail varieties of discourse about "teaching," comparing it with "telling," and seeking to throw light on issues about moral education. This study merits wide attention for its explanation and exemplification of the tools of analysis.

Also of outstanding merit, O'Connor's book (1957), though introductory in regard to the fuller range of problems dealt with by linguistic-logical analysis, exemplified in clear terms the rigor of analysis. The third chapter, which deserves wide attention, presented a lucid exposition of what is at stake educationally in the confirmation of statements about values.

Of articles dealing in a general way with the characteristics of analytic philosophy and its relationships to educational theory, Dettering (1958) offered a straightforward summary of the philosophy of language and what this "rebellious ferment" indicates about the proper role and business of philosophy of education. Newsome (1960) wrote of the function of analytic philosophy in a discipline seeking the clarification of "statements of pedagogy" and pointed to some of the questions at stake if philosophy of education is to approach the problems of the social sciences and the practice of education.

Maccia (1959), trying to disinvolve philosophy of education from the loose theorizing common in talk about the theoretical aspects of education, identified the proper function of philosophic analysis as the study of the

moves and rules in the language game. She distinguished "philosophy of the value aspect of education" from "philosophy of the scientific aspect of education" and sought to refine philosophy's role within the tradition indicated by the names of Wittgenstein, Ryle, and Scheffler.

Without quibbling about the need for and general beneficial effects of precision in thought, it is reasonable to state that the effect of these refinements of the analytic movement in philosophy of education has been to limit the range and aspiration of the philosophic endeavor. The direction of the thought of the analytic movement as it relates to educational philosophy might be profoundly affected if more attention were paid to questioning one of its basic premises, the separation of analytic from synthetic judgments after the fashion of Morton White's recent work in philosophy.

Analysis Applied to Educational Questions

In a number of inquiries writers have endeavored to carry the skills of the analytic mind into the dissection of educational questions. Price (1958) endeavored to find out when we apply the phrase "having an education," under what conditions we may say of a person that he has an education, and under what conditions we may say that teaching occurs. He exploited Max Black's distinction between the connotation or referent for a phrase and its "social presupposition." Many would agree with Scheffler's comment that Price's effort to apply analytic philosophy to an educational concern was "hopelessly intellectualistic and mechanical."

Scheffler (1958a) offered an analysis of the enterprise of justifying controllable acts or "moves" and a list of rules for justifying decisions about curriculum. In the last analysis, as he saw it, justification involves rules which express initial commitments, and there must be some basis for making those commitments. McClellan (1958), joining in a symposium concerning science versus humanities today, found that an effort to justify the teaching of humanities today makes necessary two prior questions, What is meant by "teaching the humanities"? and Why should the humanities be taught? In exploring the second question, he analyzed the kind of question it is and explained that, if it intends certain models of questions, it is beyond answering. The question is properly understood when one analyzes "teaching the humanities" so that a comparison of values can be made. Making such an analysis in turn rests upon an analysis of "explanation" when the term is used with other meanings than in discussions of "explanation" in science. McClellan's effort was thus to see what kind of talk about "teaching the humanities" is sensible in terms of logical criteria and explanatory power.

The Philosophy of Educational Science

The analytic movement in philosophy of education has also been concerned with the criticism of concepts accepted in the scientific study of

education. This is sometimes called "the philosophy of educational science," as in the excellent article by B. O. Smith (1960b) which mapped out various routes in philosophy of education. Burns (1958a) inquired into the critical-incident technique as an instrument of science, developed six criteria of empirical science, and analyzed the steps of the technique to determine their consistency with the criteria.

Nagel's article (1960) on the role of the philosophy of educational science should receive careful study. In Nagel's view philosophy should be an integrating discipline focused on articulating and criticizing the logical organization of knowledge and the logical principles involved in cognitive claims. The philosophy of educational science should be concerned with problems of the evaluation of evidence and principles for judging the competence of decisions of policy. It should explicate concepts, examine definitional procedures, criticize criteria for the empirical significance of statements, inquire into the logic of classification and measurement, and look into the logic for generalizing the applicability of ideas. It is concerned with the logical conditions for systematizing different inquiries into a common intellectual framework.

Although the impact of Scheffler's work, among others in contemporary analytic philosophy, would not lead to a restrictive interpretation and use of the tools of analysis, some philosophers of education have been concerned with the restrictions imposed by what they see as limited interpretations of *analysis*. Hence they have analyzed varieties of analysis. In an effort to clarify what is at stake in choosing clarity and precision in statement at the expense of saying something significant about the situation in education today, Barton (1960) endeavored to map out types of analysis in terms of the method, principles, purpose, and subject matter central to the particular discourse undertaken. He identified, as ideal types, logistic, dialectical, problematic, and operational analysis. It remains to be seen whether this stretching of the bounds of analysis bears fruit.

In a perceptive article, that should not be overlooked, Holley (1959) sought to bring into relationship the logical theories of Dewey and C. I. Lewis so that each might complement the other. The problems thus raised concerning the relationships between the context of experience and the place and function of logical forms are most intriguing both in philosophy and in philosophy of education.

Additional References: Ashner (1960); Brauner (1960); Ferree (1960).

Conceptual Analysis

An attempt to mark off some studies dealing with the analysis of concepts is somewhat arbitrary, for there are many different kinds of conceptual analysis. Some exemplify what we have called the analytic movement, and others are framed within more conventional philosophical points of view. The discussion begins with analyses of concepts that directly re-

flect analytic philosophy and then takes up other studies of educational concepts that depart more and more widely from contemporary linguistic-logical analysis.

Lieberman (1959) analyzed what people mean by "equality of educational opportunity." He began by considering legal meanings in court cases involving segregation and then considered the broader moral meanings and practices of competing equalities and inequalities. His method was to consider cases, real and imaginary, in which what is at stake in the concept of equality of opportunity might be indicated. Not only do these meanings vary from time to time with the human situation; they also vary with social and educational purposes and with conflicting interests, goals, and values. The study is a first-rate illustration of the use of the analysis of language, as well as a substantial contribution to the clarification of what equality of educational opportunity actually involves.

Ennis (1959) examined the usual claim that the school cannot be impartial in matters of social controversy, allegedly because it always helps some side involved in the issue. In the ordinary sense of neutrality he found the claim to contain a nondiscriminating use of "help," for, if the school is doing nothing or favoring all sides equally, it is impossible to determine which side is being helped. The real question is what stand, if any, the school should take. As he saw it, school acts have many unrealized effects, but this should not lead to overvaluation of neutrality.

Hardie (1957), in a highly commendable article, considered three historic, basic views about value problems: skepticism (including its simple, cynical, and logical-positivist varieties), intuitionism, and pragmatism. The history of ethics presents a dismal picture of arguments and counter-arguments among supporters of these different theories. In practice most people make use of all three. This fact suggests that these theories are not strictly theories in the modern linguistic sense, but are the reasons people give for their judgments rather than the logical grounds for the judgments. As such they are normal and recognizable, but to pursue these reasons in infinite regress to the reasons for giving reasons is pointless. Let educational theory concentrate, then, on the value judgments that are accepted.

The limitations of this last recommendation seem extreme. However, even within them, Hardie might have considered the expansion of the range of practical judgments of policy in an ever wider community, rather than having presumed agreements already exist which only need to be put to work in the schools. Burns (1960), in a suggestive analysis, dissected the concept of "educational implication," spreading out its psychological and pragmatic, as well as its logical, dimensions and may have helped educational inquirers to be more careful in their use of this term.

An intriguing analysis of the concept of "teaching," along with significant research possibilities in the exploration of teaching itself, was the center of B. O. Smith's effort (1960a) to analyze teaching apart from doctrines about lecture, problem, project, supervised study methods, and

the like, and apart from its involvement with learning. He endeavored to come to grips with the tactics and strategies of teaching. Having constructed a pedagogical model on the basis of the acts of the teacher, the acts of the pupils, and the intervening variables, he arrived at a pedagogical unit for use in analysis of classroom episodes. He reported the range and extent of verbal teaching behavior: logically relevant tasks of an expository nature, directive actions, and admonitory acts. Nonverbal teaching behavior he found to consist primarily in performative actions, or "showing," and expressive behavior, or "signs." This is probably the most original and promising research growing out of a philosophic analysis of a concept in recent decades in American education.

Morgenbesser (1957), exploring the problem of objectivity in ethical judgments, examined the grounds for the view that ethics is to be based in a theology and also the view that ethical objectivity is derived from the Gestaltists' theory of perception of value qualities. An objective basis for ethical judgments may be more defensible when the term "objectivity" is used to pertain to the way in which evidence is marshaled and reviewed in the support of judgments. This "classic naturalistic" approach, the author noted, has significant educational consequences.

Frankena (1958) applied a knowledge of recent moral philosophy, and its conventions, to the clarification of the task of teaching morality to children. He saw moral education not as teaching moral doctrines but as engaging in the search for a basis for morality, and he proceeded on the basis of a distinction between moral education as knowing good and evil and moral education as control of conduct. If the paper was intended to show the fruitfulness to educational practice and policy of his distinction, it hardly succeeded, for the distinction is only a formal one that is not demonstrated by the content of the paper.

Archambault (1957), pursuing the concern of his doctoral study, analyzed the concept of "need" and pointed to its ethical and cultural context as distinct from its motivational usage. Bagley (1960) sought to disentangle the meanings of "continuity," pointing out that it is not justified to assume there is a single, all-encompassing meaning that gives clear direction in all contexts. He explored the logical relations between various contextual meanings of the concept.

Raup (1960), continuing his concern with the practical judgment, explored the significance of "the community of persuasion" and extended the considerations involved in searching for the logical properties of criteria operating in community judgments. He sought so to deal with the community of persuasion that it becomes "sufficiently denotable, describable, and analyzable" to provide determinate and dependable touchstones for reliable thinking about moral judgments. Apparently he was less concerned to derive a clean-cutting "community criterion" and more concerned to explore the course wherein the place of a dynamic criterion might be found in the mediation of judgments. This line of thought is rich in suggestion and promises further insights.

A well-timed analysis of theories of mental discipline was done by Kolesnik (1958). He attempted to elicit the common ground as well as to clarify the differences among the Harvard Committee on General Education, Robert M. Hutchins, and John Dewey. Muntyan's article on "Community" (1960) provided a first-rate summary of the status of the concept of community and of the difficulties that arise in the use of this term.

An analysis of current "malignant sectarianism" in learning theory was contributed by Henle (1958). He argued that what is generally termed "behavioristic" learning theory and its typical use of "operational definitions" reveal correlations for, but not the nature of, intelligence and learning. A method and theory which gets "inside" the events studied involves philosophic critique and criteria. Such considerations indicate that intelligence is always "more than any one or all of its modalities" and hence not reducible. A philosophy of knowledge hospitable to all forms of intellect should be sought, and this is worth striving for.

In a similar vein of thoughtful commentary seeking a common ground for differing educational philosophies, Donohue (1958) saw need for a more inclusive framework for the interpretation of intelligence. He recognized at least a zone of legitimacy in the pragmatic test insofar as it deals with practical judgments but sought a wider justification for truth claims in their penetration to a "grasp of at least certain values inherently excellent."

Additional References: Dupuis (1957); Kerlinger (1960).

Behavioral Sciences and Philosophy of Education

Although in a sense most writing in philosophy of education shows a concern with the behavioral sciences, this review deals with inquiries focused on the impact of the methods, tools, and results of inquiries in the behavioral sciences on the foundations of educational thought. It begins with the more inclusive philosophical inquiries.

The most fundamental inquiry joining the fields of philosophy and anthropology with the study of the foundations of education has been done by Brameld (1957). He sought to construct a theory of culture for educators. He analyzed the thought and research of the social sciences, especially theoretical anthropology, in order to help educators come to grips with and redirect the orders and processes of culture in behalf of its highest goals. The appendix interpreting the educational significance of the thought of Ernst Cassirer should not be overlooked. Also of considerable importance was Brameld's work relating his concern with the ordering and reconstruction of cultural goals to the situation in Puerto Rico (1958a, b).

Rugg (1960) sought to focus on the act of creative thought by pulling together the creative traditions of the East and the West and exploiting the new concepts and theories of the behavioral sciences. Another long-time student of the meaning and impact of the behavioral sciences on educational theory is Benne (1959), who stated some of the problems he has sensed as

he has joined endeavors with a wide range of behavioral scientists. He raised significant and intriguing questions about the place and role of theory in research and in roles of the practitioner. Since, as he saw it, one man's theorizing may be another man's nonsense, he questioned the value of clarifying the functions of theorizing. He saw the findings and methodologies of the behavioral sciences as aids to building a framework for concentrated, rather than divisive, efforts.

Other inquiries of less comprehensive scope have attempted to look into some particular aspects of the research and achievement in the behavioral sciences. Bruner (1960), in a stimulating and discerning paper, explored what is involved in the learner's being his own discoverer. Taking the philosophic role, he examined the significance of the empirical evidences concerning the act of creative discovery and suggested hypotheses for understanding and guiding this aspect of inquiry. With admirable clarity of analysis, Burns (1958b) showed that some pragmatists have supported an untenable disjunction in their acceptance of psychological field theory at the expense of a critical behaviorism.

Gordon (1958) examined the meaning and probable educational use of seven basic behavioral-science concepts, for example, "process," "organization and order," and "multiple causation." Rislov (1959) sought to contribute to the clarity and common understanding of the meaning and use of "ideology" and "utopia" as categories for social analysis. Washburne (1958) inquired into the relationships between educational theory and educational social structure by way of the concept of bureaucracy, and he identified points of conflict between theory and structure by means of the bureaucracy construct.

Levit (1960) analyzed the implications for educational philosophy of recently developed concepts in the field of color perception, interpreting the work of the "color scientists" as exemplifying present-day treatments of the "secondary qualities" of experience. He was led to the belief that much of philosophy of education is an effort to "rationalize" its autonomy, as well as its particular premises, rather than to improve its processes of inquiry. However, other interpreters criticize Levit on the ground that he confuses epistemology with psychology.

Additional References: Gruen (1959); Kneller (1960); Rugg (1958).

Existentialism in Philosophy of Education

In large measure, the influence of existentialist thought on philosophy of education has been indirect. Philosophers of education who are not primarily existentialists have explored and used existentialist thought in widening and deepening their orientation. For example, in the Indiana University papers celebrating Dewey's centennial, edited by Clayton (1960a), Broudy brought to his analysis of Dewey's theory of problem solving an existentialist concern with the "predicament that defines human

existence." His point was that much of the moral demand upon education is defined by predicaments rather than by problems and their solutions. Similarly, Kircher (1959) urged the extension of the base of the disciplines which feed an educational theory to the point of denying a uniquely directive role to philosophy. The roots of his position are existentialist in the sense that he reacted against a narrow quest for authentic doctrine and sought a more inclusive consideration of the human situation.

The most direct effort to relate existentialism to educational theory and philosophy was Kneller's (1958). Further inquiry is indicated to see whether he represented the sweep of existentialist thought accurately and adequately. A confusion between exemplifying a general conception of existentialist modes of thought and explicating substantial existentialist contributions in terms of their educational meanings seemed to color the work. Morris (1958) continued his effort to correct or extend experimentalism by way of existentialism's respect for the subjective. The orthodox experimentalist doctrine of sociality, as he saw it, should be reconsidered in view of segments of human thought and action not available within the limits of the experimentalist's concept of method.

Greene (1960) argued for the importance of those stubborn, desperate questions which defy the application of empirical tests and criteria of verifiability in truth-seeking. She directed attention by means of a range of references to the role of "vision and the synthesis of meanings" that lead to meanings that are noncognitive and "to be celebrated for what they are." Carroll (1960) extended the concept of alienation to the teacher's need for a sense of authentic being. She saw an existentialist insistence on the transcendent quality of the self as an antidote to the excesses of "the adjusted personality" and the pressure of cultural determinants. Nichols (1959) sought to explain what is involved in existentialism's denial of the premise that intelligence is at the heart of being human or of being ethical. This "true anti-intellectualism" was said to "release" the individual.

Additional References: Browning (1960); O'Neill (1958).

Philosophic Treatment of Policy Problems

In recent years some have thought that much of philosophy of education, and other fields of philosophy as well, has been so taken up with the quest for precision and clarity that philosophic attention to practical decisions and policies in public life has been neglected. After attention has been given to some inquiries relevant to this consideration, inquiries dealing with a wide range of educational policy will be reviewed. Studies that focus on a particular aspect or area of policy will then be considered and, toward the end of the section, those dealing with religion in education.

Stanley (1958b) proposed that philosophies of education come to grips with the theoretical aspects of the concrete issues and problems of educa-

tion. He argued that the questions, "What is the proper scope of responsibility of the public school?" and "What bearing should differences in ability and interest have on school programs and standards?" lead into key issues in philosophy of education. As he saw it, if issues in educational and public policy were studied directly, the results would lead to critically reconstructed educational theories germane to the current crisis in school and in culture.

Clayton (1960b) endeavored to assess the problem created when philosophy of education is interpreted in overly restrictive ways—when it is interpreted as the reading off of the educational implications of traditional systems of philosophy or when it is reduced to formalistic analysis. He urged that philosophers come to grips with the pressing interests and demands in educational policy today and in so doing identify and extend the philosophic skills and abilities essential to creating reasonable and socially responsible judgments.

Sayers and Madden (1959) contributed a relatively inclusive study of what is at stake in policy conflicts in American life. They discussed problems of educational policy within the context of the clarification of values of a free society and a cultural interpretation of man's nature and purposes. Although the effort left some gaps in the study of this context and in the relation between policy and judgments of practice in schooling, it resulted not only in a useful text but also in a suggestive treatment of the foundations of educational policy.

Thayer (1960) surveyed the distinctive responsibilities of public education today in the light of current confusions, changing conditions, and the significance of historic policies. He brought together criticisms of public education so that their impact upon basic directions of public and educational policy can be inspected. Policies concerning religion and education, the freedom to learn and to teach, segregation, and federal aid were presented and explored in such a way that they can increasingly receive scholarly attention in programs of teacher education. Of briefer writings, Stanley's (1958a) is a discriminating summary of the conditions within which policy problems in education should be approached.

Lieberman (1960) criticized the "anachronistic and dysfunctional power structure" in American education and advocated sweeping organizational reconstruction. The problem, as he built and clarified it, centered in the strategy of educational leadership. Disagreements with Lieberman's appraisal, as well as with his faith in organizational strategy, should not obscure the merits of his sharply critical analysis of the power structure in the profession. Mason (1960) attempted an analysis in policy terms of the social basis of contemporary life and education. He took the view that questions of educational policy hinge on the controversy between scientific method and its results in educational theory and practice on the one hand and the values embodied in the humanistic tradition on the other. In the main, Lieberman's and Mason's studies represented opposite sides of the coin in policy-centered philosophies of education. Each involves over-

simplifications and needs to be qualified by a range of other considerations.

Additional References: Bayles (1957); Farnand (1959); Hullfish (1958).

Policies Relative to Religion and Public Education

One of the most contentious areas in which the philosophical mind comes to grips with basic policy problems is that of relations between public education and religion. The companion articles by McCluskey (1960) and Butts (1960) focused, respectively, on the arguments for and against public funds for parochial schools. The heart of McCluskey's argument lay in his interpretation of the state's responsibility for the enlargement of religious freedom. According to this view the state should subsidize parents to enable them to choose freely the school manifesting their religious views. Butts's argument rested on the thesis that there is imperative necessity for free public schools in the promotion of the life of a free people. In his view, maintenance of free public schools in the interest of all the people, not a state monopoly on education, is an integral responsibility of a democratic government.

The critical inspection of the grounds and consequences involved in this key question in public and educational policy should have priority of attention in philosophy of education. The Roman Catholic position on education, particularly as it focuses on public responsibility for support of parochial education, has been clearly stated by McCluskey (1959), Blum (1958), and Dubay (1959). In a different, yet concerted, way they argue in defense of pluralism based on government support of "independent" schools and "freedom" based on benefits from the public funds to support parents' choices.

Thayer (1958) spelled out most succinctly the dangers of the efforts of church groups to introduce sectarian religious instruction in the public schools. The pamphlet distributed by The Fund for the Republic (1959) provided penetrating analyses of the issues, the argument by Lakachman being particularly insightful. Phenix (1959) developed a different and basically challenging way to interpret the school's proper role in religious experience.

Additional References: Brickman and Lehrer (1959); Phenix (1958).

Interpretations, Evaluations, and Criticisms of Systematic Educational Philosophies

Under Brickman's (1959) editorship, *School and Society* attempted an assessment of educational theory. In its pages Bayles made a case for a "pragmatic-relativism" that for him resolved most of man's dilemmas; Butler found little delving into the grounds for a neo-idealism today;

Broudy identified realism's belief in a thoroughly objective anchorage for thought, conduct, and education in various levels and movements of modern life. McMurray found conflicting basic interpretations of pragmatism, especially inadequacies in it for social reconstructionists. Brameld pointed up three imperatives for an education in our age and was hopeful of the contribution of the behavioral sciences toward them. Some found philosophy's promise as revealed in the issue on educational theory to be minimal.

Of the volumes setting forth systematic philosophies of education, Berkson's (1958) was outstanding. He wanted to stand within the Dewey tradition, yet to reconstruct it in ways which some think deny its distinctive contributions. He found the source of educational values and ideals in "the historically developed culture" of the West and sought to relate these ethical goals to the social-institutional structure of American life. Despite some questionable interpretations of experimentalism, it represented a worthy effort, as John S. Brubacher put it, "to move educational philosophy off the dead center of the present impasse."

Of articles dealing with systems of educational thought, Beck's (1960) sought the intellectual basis of neo-humanism and the new conservatism. He found little in the way of substantive contribution coming from these movements. In recent educational thought, with the exception of *The Case for Basic Education*, edited by Koerner (1959), both movements have done more in the way of attacking than of contributing to the improvement of American education. Villemain and Champlin (1959) centered attention upon Dewey's concept of the aesthetic as a quality generic to all experience and held that we have not yet explored this concept in relation to the great themes that make up Dewey's educational theory. They held that qualities in the aesthetic Deweyan sense may be represented by "qualitative symbols," may be subjected thereby to methodological analysis, and may contribute to an aesthetically oriented philosophy of education. The complete meaning and educational significance of this orientation are yet to be worked out.

Brumbaugh and Lawrence (1959) demonstrated that interpretations of Aristotle's educational philosophy can and should be made from a point of view other than that of a modern scholastic. They analyzed the meanings of *eudaimonia* and *arete* in the inclusive range of Aristotle's thought, thereby preparing the way for a *rapprochement* between the thought of Aristotle and that of Dewey. Also of high order was Burnett's (1957) interpretation of Whitehead's view of creativity and its meaning for producing the conditions of creativity in education. This work apparently grew out of Burnett's doctoral study (1958), which examined Whitehead's educational philosophy in its systematic character. Martin (1958) sought to bring Whitehead's thought into relationship with contemporary "consensus theory" as found in *The Improvement of Practical Intelligence*.

Additional References: Adler and Mayer (1958); Butler (1957); Keel (1960); Rich (1958); Yeager (1959).

Interpretations of Dewey's Educational Thought

Geiger's (1958) thoroughly informed study of Dewey centered its interpretation upon Dewey's theory of art and the meaning of art. The integral wholeness of the aesthetic quality of experience pervaded, as Geiger saw it, Dewey's treatment of problem solving, knowledge, scientific method, and other aspects of experience. In the volume edited by Blewett (1960), Catholic scholars analyzed and appraised selected themes of Dewey's thought in an effort to come to grips understandingly, rather than resentfully or superficially, with the wellsprings and meaning of his thought. The search for understanding, exemplified in these essays, "carried on without bitterness and partisanship," with a focus on questions to be "illuminated by an appeal to discussable data rather than to slogans" is itself a notable contribution in our time. The appraisal of enduring aspects of Dewey's educational philosophy by Childs (1959) was also concerned with an unresolved tension in Dewey's thought between the method of research and the communication of established meanings.

The papers by Broudy and by Brubacher in honor of Dewey, edited by Clayton (1960a), were of high order. Broudy developed a criticism of problem solving primarily on the grounds of its alleged failure to provide substantial postulates for truth claims, its insufficient place for awareness, and its minimal place for the mastery of tested knowledge. Brubacher corrected 10 common and important misinterpretations of Dewey's thought.

Berkson (1960) found Dewey to overplay the primary experience of the individual as against evolved social experience and hence to fail to provide an educational policy based explicitly and unequivocally on the needs and ideals of the community. There is need, as Berkson saw it, of a new assessment and a new emphasis based on continuous inquiry and self-criticism. Gowin (1959) argued that Dewey's experimentalism is incompatible with Gestalt theory as well as with atomistic mechanism. Both share a common assumption of the immediacy of knowledge, and this is a view that Dewey rejected.

General Interpretations and Evaluations

There remains a range of studies of high quality which do not fall within the major headings of this review. Benne (1958) identified three clusters of assumptions in educational theory which make a profound difference in programs and practices of adult education. Assumptions centering in valuations about the nature of man, about learning and knowledge, and about pedagogical authority were interpreted so that they could be recognized in educational problems generally, as well as in adult education. The entire monograph is of note as a pioneering contribution to the philosophy of adult education.

Holmes (1957) provided a British interpretation of the significance of the current criticisms of American education. He began by suggesting a theory

of criticism within which he appraised insightfully what is at stake in contemporary criticisms. His efforts lead us to see that a thoroughly developed critique of criticism would provide a discriminating basis for thoughtful response to criticisms of education.

Phenix (1958) produced not only a textbook but also a book stimulating a wide range of leading questions not usually encountered in other volumes concerned with philosophy of education. His discussions of mathematics, history, and natural science, for example, contribute to the range of sensitivities with which philosophy of education might well be concerned.

Additional References: Bereday and Lauwerys (1957); Blanshard (1959); Champlin (1958).

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CHAPTER III

Sociology of Education

WILBUR B. BROOKOVER and DAVID GOTTILIEB *

Introduction

THE PURPOSE of this chapter is twofold. The major portion attempts to review basic research studies of educational institutions in which the propositions, concepts, and methods of sociology have been employed. The final section deals with areas which the authors see as strategic for research in the sociology of education. In both sections the concern has been with investigations which have concentrated on the testing and development of sociological and social-psychological theories.

Educational Institutions and the Community Matrix

Writers on educational institutions as they function in the total society recognized the importance of research in this area, but only a limited amount of research was done. There was little evidence of an identifiable trend. Some clusters of interest are suggested by the topics that follow.

School Culture in the Community

Among the few studies which focused on the culture of the school as it varies from or is contrasted with community norms, Coleman (1959) examined the adolescent subculture with particular reference to its impact on academic achievement. He found a significant adolescent culture, with considerable homogeneity among schools of varying types in different community settings. The norms with highest priority were found much more likely to focus on athletics, other school activities, and social popularity than on academic achievement. Coleman's study was limited to varied mid-western schools but was based on careful examination.

Goldman (1959), examining factors associated with school vandalism, revealed that schools varied in this regard from one section of the city to another and reflected the norms held by teachers and students as well as by the neighborhood. His study suffered from a lack of theoretical orientation.

Additional References: Bitner (1954); Bottosto (1959); Cannon (1957); Davidson (1959); Floud and Halsey (1959).

* The authors wish to acknowledge the assistance of Leonard W. Phillips in preparing the bibliography and reviewing the numerous papers.

School Administration and the Community

Administrators have been concerned with the attitudes of community leaders and other citizens toward the school and their perception of the school's function in the community. Bullock (1959) developed a series of instruments designed for use by administrators to measure community attitudes toward education. These gave some index to the community's support and expectations of the educational system. Johnson (1952), studying the layman's and the professional educator's concepts of the school's role in a Tennessee county, found the communities willing to do more for the school than they were generally permitted to do and also desirous of a broad educational program rather than a traditional academic one. He found little difference between laymen and teachers in regard to concept of the school's role in the community. These studies indicated recognition of the fact that the school functions in a community social setting and that the school administrator must function in a social system. Getzels (1958), examining the nature of school administration as a social process, emphasized the existence of an informal system of social relations which operates in the school.

Hunter (1959) examined perceptions of the superintendent's behavior in relation to school size in 16 midwestern schools of varying sizes. He found greater discrepancies between teachers' perceptions of the superintendent and the superintendent's self-perception in large schools than in small ones. Similar discrepancies between the superintendent's self-perception and the board members' perception of him were not found to be related to the size of the school.

Bernstein (1959) studied teachers' perceptions of principals, superintendents, and boards of education, and the relation of these perceptions to teacher morale. She found a significant relationship between the morale and the teachers' perceptions of the principal and the school board.

Additional References: Mattlin (1960); Stapley (1957).

Control of Schools

A major issue in discussion of public education is the question of federal versus state and local control. Although this is a question of national policy and decision, there was little empirical research on it. The American Assembly (1960) focused on the role of the federal government in higher education and set forth facts concerning the extent to which the government is involved in research and other means of supporting higher education. Comparable data on elementary and secondary education are not yet available.

There were significant analyses of the controlling influences on decision making at the local level. Gross (1958) and Gross, Mason, and McEachern (1958) studied a major portion of the school districts in Massachusetts and produced both a theoretical framework in which to observe the school

administrator and an analysis of the influences which operate to control education in these communities. The latter book was the most comprehensive study yet done of the pressures on and support for education provided by various community segments and agencies. Gross (1958) presented a wide range of data relating to community influences on both the superintendent's and the school board's actions. They also indicated the range of decision making which is permitted to the superintendent.

Among studies of social backgrounds or community roles of school-board members and the relation of these factors to their attitudes and behavior concerning schools, those of Albert (1959), Caughran (1956), Eaton (1956), and Teal (1956) focused on various aspects of the social composition of school boards or the socioeconomic backgrounds of members. Although earlier studies have shown variation in composition of school boards, it is clear that members tend to come from upper socioeconomic strata. Contrary to assumptions, research does not support the hypothesis that such status is correlated with conservative attitudes toward education. Some findings indicated no relationship between socioeconomic backgrounds and attitudes toward education; others suggested that higher educational and occupational levels may be associated with liberal attitudes.

One important contrast in control is that of public versus nonpublic, parochial, or private school organizations. Although parochial and private schools have existed throughout American history, social scientists have given little attention to the ways in which such schools function differently from public schools. There were, however, three significant studies of the different systems. Fichter (1958), reporting an intensive community study of a single parochial elementary school, examined its general characteristics and observed how attitudes of students, faculty, and parents compared with those which prevailed in the public schools in this community. This intensive study entailed extended participant observation, as well as numerous interviews and other data-gathering devices. Fichter concluded that this elementary parochial school functioned as the largest single focus for co-operation and solidarity among the parishioners.

Rossi and Rossi (1957) reported three studies of parochial education in the eastern United States. Tracing the background of parochial education in the United States, they concluded that national ethnic groups, such as the Irish and the Germans, have been the major factor in the development and maintenance of parochial education. Fichter (1958) questioned the conclusion that ethnic origins rather than religious factors have served to maintain the Roman Catholic schools, although he did not submit evidence to controvert it. The Rossis, however, found the parochial-school Catholic more closely identified with his church than the public-school Catholic, a fact which tended to support Fichter's observations. On the other hand, the Rossis found no evidence that the parochial school alienated Catholics from the community.

The third study dealt with the indoctrination of nurses in parochial schools as compared to that in secular hospitals. Deutscher and Montague

(1956) found freshmen of seven nursing schools (Catholic, Protestant, and nonsectarian) essentially alike in their attitudes, but Roman Catholic and Protestant seniors differing significantly from seniors in nonsectarian schools.

Additional References: Getzels and Guba (1957); Shirley and Cropp (1957).

Communities and Desegregation

Community factors related to racial desegregation received considerable attention. In addition to previous research reviewed in this field by Dodson and Linders (1959) and Van Til (1959), Tumin, Barton, and Burrus (1958) studied a Southern community to determine the degree to which differences in formal education produced different attitudinal shifts with regard to several aspects of readiness for integration. He found people with higher education somewhat more favorable toward desegregation. Dwyer (1957), studying four Missouri school districts where school segregation had been discontinued, found Negro teachers ambivalent toward desegregation and in a position to influence the integration process. White teachers were more opposed to the integration of Negro teachers than to the integration of Negro children. Only a few of the Negro teachers were employed in integrated schools.

Southern School News reported Weinstein's (1960) survey of 88 Negro families in Nashville, Tennessee. He found education of the parents to play an important part in their decisions to send a child to a segregated or an integrated school. His findings suggest that higher education of parents leads to selection of the integrated school.

Spruill (1958), in contrast to Dwyer, concluded that the gains of Negro teachers in terms of jobs as a result of integration have outweighed losses. Kettig (1957) found considerable opposition among 300 white teachers in large Ohio cities to integration with Negro teachers. Women teachers were less willing than men teachers to approve integration; teachers experienced with racial groups were much more willing to accept integration than those inexperienced. There was no significant difference in terms of the subjects which teachers taught.

Additional References: Dalomba (1956); Hyman and Sheatsley (1956); Rivers (1959); Williams and others (1956).

Teacher and Administrator Roles in the Community

Among studies of teachers' and administrators' roles in the community, that of Welch (1956) sought to determine the out-of-school employment and related activities of the 14,000 Indiana elementary-school teachers by means of a questionnaire to a 7-percent sample. Most gave need for greater income as a reason for out-of-school employment, but no deep probing for alterna-

tive reasons was done. Other out-of-school activities reported most frequently engaged in were housework, reading, and home responsibilities. Most respondents engaged in several professional activities during the year, but there was no consensus concerning the adequacy of free time to engage in out-of-school professional activities.

Morris (1957), analyzing the duties of 500 superintendents in 11 mid-western states, discovered that the typical superintendent began his career after approximately five years of teaching and averaged about four and one-half years in each of his administrative positions. About one-third of the group had been promoted to their current positions from within the school system.

R. Smith (1960) intensively analyzed the community role expectations held for teachers by three midwestern communities of varying sizes and varying degrees of urbanization, and found little difference among teachers, school-board members, administrators, and citizens with regard to expectations. In general, elementary-school teachers tended to be most restrictive; secondary-school teachers and citizens were more liberal. Comparison with Greenhoe's study in the 1930's indicated considerable change with regard to smoking, drinking, and participation in community activities. It was interesting to note, however, that teachers are still expected to live in the communities where they teach and do their shopping there.

Schools as Social Systems

Recent institutional research was directed toward viewing educational institutions as continuing social systems.

Effect of Formal Organization on Behavior

There has been considerable emphasis on observing relationships between the formal organization as determined by job definitions and the manifest behavior and interrelations of persons in their positions. Berner (1957), for example, discussed the relation between the formal organization and the informal communication structure of two high schools. He noted that official lines of communication were effective when they were in consonance with the informal communication structure. Further, the effectiveness of a particular communication was more closely related to the value assigned to the message content by the recipient than to the status of the originator.

Shapiro (1958), carrying the analysis of effectiveness of communication a step further, concluded that the size of the school determined how communications would be reacted to. From an investigation of 11 schools, he found the smaller schools superior in communication response, group cooperation, and staff performance.

Additional References: Boren (1959); Taylor (1958).

Social Structure and Socialization

Parsons (1959) related the classroom structure to its primary function as an agency of socialization. His contention was that the elementary-school phase is concerned with the child's internalization of motivation to achieve and that the focus is on the level of capacity. In the secondary-school phase he saw emphasis placed on the differentiation of types of achievement. The secondary school, because of its abundance of activities and variety of subject matter, subjects the student to a wider range of statuses, peers, and adults, and forces him to choose among alternatives within the framework of the system. Parsons saw this multiplicity of choice as a factor that may determine the direction students take in both early and later stages of their lives.

The operational aspects of the social system of a high school were spelled out in greater detail by Gordon (1957). He explored the hypothesis that "the dominant motivation of the high-school student is to achieve and maintain a general social status within the organization of the school." This organization was seen to exist on three levels: the *formal* organization of teachers and administrators; the *semiformal* organization of the extra-curricular activities; and the *informal* organization of the students in groups defined by certain sociometric choices. Though he made little attempt to account for the behavior of certain deviant groups (that is, the 25 percent of the students who were not chosen within the informal organization), Gordon presented some interesting findings about relationships between school achievement and informal group participation. It is difficult, however, to determine the total impact of each of the three organizational components, inasmuch as Gordon did not attempt to test relationships between adjustment, for example, and involvement in the informal or semiformal school organization.

Coleman (1960), reporting the results of an investigation of 10 mid-western high schools (where interviews were conducted with students at various grade levels, parents, and teachers), pointed out some of the consequences for the school system when the values of the adult governing body are in conflict with the values held by a student's adolescent peer group. His research indicated that a possible effect of the student value system on education is removal of highly intelligent students from an academic-achievement orientation to one that holds greater prestige among peers. Coleman contended that there may be need for restructuring of educational programs in order that academic achievement can enjoy a status among students comparable to that of football, cheerleading, and other school-sponsored activities.

The research dealing with the school as a social system reflected great interest in school climates and other dependent variables. Tyson (1957), for example, dealing with the problem of school size and teacher-pupil relationships, concluded that small schools are most conducive to interaction between teachers and pupils. The question which remains unanswered

is whether high teacher-pupil interaction is beneficial, and, if so, in what areas and at what stages of education.

Investigations of the now famous dilemma of authoritarianism versus democracy continued. Results remained vague and conflicting. Employing the *F* scale, Regan (1958) observed that students under authoritarian teachers were more likely to report school-connected fears than students in democratically oriented classrooms. J. B. Wilson (1955) and Sharp (1958), on the other hand, concluded that these same variables account for little in variations in pupil relationships and pupil achievement. Anderson (1959), reviewing 49 experiments dealing with this problem, believed that the evidence failed to demonstrate that either authoritarian or democratic leadership was associated with higher productivity. It was his contention that this construct did not provide an adequate conceptualization of leadership behavior.

Effect of the College on Socialization

The effect of the college experience on socialization, particularly on student value structures, was also an area of increased research activity. Jacob (1957), who reviewed a comprehensive body of research, stimulated a strong reaction from researchers, educators, and popular commentators with his conclusion that institutions of higher education do little to alter the value systems of their students. Jacob contended that changes in values are not so much a product of faculty or curricular influences as they are a result of peer-group pressures. Some of the reaction to Jacob was discussed by Bloom and Webster (1960), as well as in the other chapters of the October issue of the REVIEW. Freedman (1956) came to conclusions similar to Jacob's as a result of research conducted at Vassar. On the other hand, Sanford (1959), who also dealt with data collected from Vassar students, presented some evidence which contradicted Jacob and Freedman. Comparing data collected from freshmen with those collected from seniors, Sanford stated: ". . . there are also some vivid signs of growth . . . signs of striving for valued personal objectives, for serious purposes, for independence, for realism, for self-respect, for wholeness, for intimacy."

There was evidence that faculties have something to do with the socialization process of graduate students and those in professional schools. Gottlieb (1960), surveying 2842 students in 25 graduate schools, found student changes of career preference related to faculty contacts and specific departmental climates. Similar observations were made by other social scientists, such as Becker and Geer (1958), Hughes (1959), and Merton, Reader, and Kendall (1957). Merton, Reader, and Kendall presented evidence from medical schools to show that a faculty not only plays a part in altering career choices but also communicates the values and attitudes of the profession.

From a study of 11 colleges, Goldsen and others (1960) observed: "... the findings of the present research call attention to what is almost a sociological truism and yet is often overlooked: that if young people are exposed to four years of institutional norms and values in the very milieu in which they are explicit and authoritative, they will become socialized to the predominant values of that milieu and will come to acknowledge their legitimacy. The present study shows that this occurs with regard to academic educational values."

Additional Reference: Barton (1959).

Recruitment and Attrition

Concern with manpower resources and our educational system as it relates to them stimulated new inquiry into the characteristics of teachers and students and the general conditions surrounding higher education.

Recruitment and Selection of Faculty

Wayland and Brunner (1958), using data from the 1950 census, reported that: (a) female teachers outnumber male teachers, and the decline of males in the profession has been most pronounced during the past 10 years; (b) the professional mortality rate is about the same for males and females until about age thirty, and then many more males drop out; (c) among nonwhite teachers a larger proportion of both sexes stays in the profession; (d) salaries have increased steadily during the past 10 years. Although this report presented some interesting findings, it failed, because of the nature of census data, to differentiate among teachers located at different levels of the school system.

Several studies sought to distinguish characteristics which identify teachers. Lapidus (1955) and Martin (1958) attempted to pinpoint differences between young people who choose teaching as a career and those with other preferences. Lapidus found little difference in personality traits; social-science majors obtained the highest grades in both teacher and nonteacher groups. Martin, on the contrary, found significant differences in various areas.

Ryans (1960) found differences between "better" and "poorer" teachers classified on the basis of classroom observation. Among 6000 teachers in 1700 schools, the "better" tended (a) to be generous in appraisal of the behavior and motives of others; (b) to possess strong interest in reading and literary affairs; (c) to be interested in music and painting; (d) to participate in social groups; (e) to enjoy pupil relationships; (f) to prefer permissive (or nondirective) classroom procedures; (g) to manifest superior verbal intelligence; and (h) to be superior in respect to personal adjustment. Unfortunately, this fine study does not examine relationships between teaching skill and certain background factors, such

as socioeconomic differences, career-commitment patterns, and college-training experiences.

Additional Reference: Harper (1958).

Attrition of Faculty

A number of explanations were set forth to account for teachers' leaving the profession. Emerich (1957), who questioned 668 Michigan college teachers, found "long hours" to be the most frequently verbalized complaint. Budde (1960), studying teacher permanence by grade levels in a 10-percent sample of Michigan school systems, discovered turnover to be highest at the junior-high-school level and lowest in the elementary grades. The greatest mobility between grade levels was from junior high school to senior high school. Harris (1957), examining data on Ohio public-school teachers who withdrew during 1953, observed major reasons to be maternity, marriage, and other family situations.

Various efforts were made to illuminate the role conflicts of the male elementary-school or secondary-school teacher. Thurman (1959), studying male elementary-school teachers, found most of his sample content with the career they had chosen, although few expected to remain classroom teachers.

Mason, Dressel, and Bain (1959), in a study based on a national sample of beginning teachers, found differences in the career orientations of male and female teachers. Only a small proportion of each group expected to stay in the profession until retirement. Male teachers looked on their positions as steppingstones to administrative responsibility. In terms of personal involvement, males were more closely tied to factors intrinsic to their work and to their need for job satisfaction; career plans of women depended more upon extrinsic factors and conditions which were independent of job satisfaction.

Charters (1956), examining the records of teacher trainees over a 10-year period at the University of Illinois, presented some dramatic findings. About 40 percent of those qualified to teach never entered the profession; among those who did, the attrition rate was so great that only half were still teaching at the end of two years; of 1000 teachers, fewer than 100 continued to teach more than 10 years. Charters concluded (and few people would disagree) that there is need for re-evaluating the selection process.

Kearney and Rocchio (1956) found differences in attitude toward pupils between teachers prepared at liberal arts colleges and those prepared at universities. The university-trained teacher was found the more outstanding, at least with regard to student-teacher contact. The analysis, however, may be distorted by the differences between students who chose to enroll in liberal arts colleges and those who chose universities.

Caplow and McGee (1958), studying the dynamics of the academic marketplace, observed two kinds of recruitment: "open" (competitive)

hiring and "closed" (preferential) hiring. They went on to say: "In theory, academic recruitment is mostly open. In practice, it is mostly closed." They saw a kind of nepotism within the academic system and contended that informal relationships between persons who make decisions actually determine who gets what kind of job and where.

Lazarsfeld and Thielens (1958), looking at the academic marketplace in yet another dimension, were concerned with determining what life was like for social-science faculty members during the "loyalty oath" period. They concluded that a number of institutional and individual factors were involved in how faculties reacted to the situation.

Additional References: Dunn (1955); Hill (1956); Walker (1958); Walters (1958).

Selection and Attrition of Students

There is a growing body of literature dealing with criteria for the selection of college students, most of which has already been reviewed by Fishman and Pasanella (1960), but little knowledge about the factors which encourage continuation or attrition among students has been produced by empirical research. Clark (1960), examining the factors which influence junior-college students to terminate or to continue their schooling, pointed out that the junior college sorts out the "undesirables" from those who have the potential to move out and up. Two studies, Youmans' (1959) and Phillips' (1958), dealt with certain socioeconomic correlates of educational aspirations and intentions. Both observed that students with high socioeconomic backgrounds were more likely to extend their education. Both studies, however, allowed for few generalizations, since the samples employed were extremely limited. Phillips dealt with females at a single university; Youmans' respondents were from three of the low-economic-level counties in rural Kentucky.

Davis (1960) presented evidence that family and class background, at least among graduate students, is not a great factor in determining continuance of professional training. He observed that by the time a student enters graduate school parental ties are attenuated. In many cases the student is married, has a family of his own, and is no longer receiving financial aid from his parents. His attendance at an institution distant from his parents prevents frequent interaction with them and, even though he is of lower-class background, the selectivity and processes are such that he has often taken on values and attitudes not shared by his parents.

Additional References: Cass (1957); Holland (1957); Slocum (1956).

Social Factors in Academic Achievement, Aspiration, and Selection of Students

Current concern with the cold war has focused great attention on the academic resources of the nation. Although primary attention has been

given to the identification of those youths who presumably have superior innate abilities to learn, some has been given to social factors related to achievement levels, educational aspirations, and the selection of students for higher education.

Factors Associated with Residence and Family Background

The community or residential locality of the students has received the attention of several researchers. Haller and Sewell (1957) studied the educational and occupational aspirations of high-school seniors of both rural and urban schools in Wisconsin, rigorously controlling for intelligence. They found both educational and occupational aspirations among girls not significantly related to rural-urban residence; though the occupational aspirations of the boys were also not related to residential background, their educational aspirations were.

Haller (1960) studied the occupational aspirations of a group of Michigan farm-reared youth and found the more emotionally stable, resilient, independent, and self-sufficient farm boys with better self-control more likely to plan for an occupation other than farming. Boys not planning to farm more commonly had parents who held high educational and occupational aspirations for them, and themselves believed that university training was desirable. These boys took fewer agriculture courses in high school.

A. B. Wilson (1959) examined the aspirations of high-school boys attending schools which differed (because of residential segregation of social classes) in normative climates regarding academic aspirations. He found that academic achievement, occupational aspirations, and political preferences, as well as academic aspirations, varied with differences in the school climate even when personal variables were controlled.

Gregory (1958) analyzed the eleven-plus examination results of students in an English city with particular reference to the form of school control: county, Church of England, or Catholic. He found no difference in the performance of students among the various types of school management, but the results indicated that selection varied along geographic and residential lines and the social-class identification of the families.

The family background alluded to in Gregory's study has been examined by recent studies in the United States. Sewell, Haller, and Straus (1957), in a study of nonfarm high-school seniors in Wisconsin, with intelligence controlled, found the levels of educational and occupational aspiration of both sexes related to the family socioeconomic status as measured by the North-Hatt ranking of occupations. The relationship was consistent and clear except in the case of the occupational aspiration of the girls. Girls from high-status families frequently chose high-status occupations, but the relationship was not as consistent as among the boys.

Young (1958) completed a related study in Wisconsin, to determine what factors in family background distinguish youth who intend to go to

college from those who do not. Young studied high-school graduates who ranked between the seventy-fifth percentile and the ninety-ninth both in final class standings and on the *Henmon-Nelson Tests of Mental Ability*. Of the parents of this group of high achievers, significantly more parents of students attending college than parents of students not attending college were college graduates; held professional, executive, managerial, or official positions; were economically above average; and encouraged their children to attend college. These parents also regarded college experience as socially advantageous and worth financial sacrifice. Parents of students who did not attend college were more likely to be engaged in agriculture or factory work and were less able to help finance their children's college education.

Additional Reference: Lehmann (1957).

Selection and Education of the Talented

Concern for the identification and education of talented youth has brought forth many proposals to provide them separate educational facilities. The writings were extensively reviewed by Fliegler and Bish (1959). Smith (1959) studied responses of 3500 people (PTA, community, and labor leaders; students, high-school teachers, guidance personnel, and principals; college professors from a range of fields) in answer to the question of what the high school ought to do for the gifted. A large majority favored some special education. Most respondents advocated for the gifted: segregated classes in all subject fields, teachers with special qualifications, high academic standards, and a hard core of required subjects. They believed personal guidance and encouragement to be the most influential factors in the development of intellectual resources. Poor teachers and routine subject matter were thought to be the greatest deterrents to achievement. Most respondents believed some form of subsidy desirable for needy gifted students, but they were divided as to whether this should be financed publicly or privately. Teachers in the sample tended to be in favor of similar classroom management for all students, but guidance directors were definitely in favor of a procedure which would permit more individual attention to the gifted. Administrators' viewpoints fell between.

Several major publications were devoted to the education of the academically gifted or talented. Among them were the fifty-seventh yearbook of the National Society for the Study of Education (1958), the Edgar Stern Family Fund's report (1960), and studies edited by McClelland and others (1958). The society's yearbook reviewed research on various aspects of giftedness and programs for education of the gifted. Relatively little attention was given to social factors related to giftedness or to the social implications of special programs. Goldberg (1958) included some discussion of cultural factors in the development of talent, but primary emphases were on identification of those who have "gifts" and the question of what should be done about them.

A major portion of the studies edited by McClelland and others (1958) dealt with social factors. Bronfenbrenner, Harding, and Gallwey (1958) discussed measurement of social perception. Kaltenbach and McClelland (1958), reporting a study of the perceived dimensions of success in small towns, found evidence that people distinguish between achievement standing and social standing even though these values are correlated. Strodtbeck (1958), considering family interaction and values in relation to achievement, opened a new line of research by examining the differential status mobility of two ethnic groups (Italian and Jewish) in American society. He found three values related to high mobility: (a) belief that "a person can and should make plans which will control his destiny"; (b) "a willingness to leave home to make one's way in life"; and (c) "a preference for individual rather than collective credit for work done." He also found that the power relations in the family are a significant factor in such achievement, but operate quite differently in the two ethnic groups.

The Edgar Stern Family Fund's report (1960) gave the reactions of a panel of outstanding American scholars to the research and movements which promote excellence in society. Much of the discussion dealt with the rewards and social climate which provide motivation for excellence.

Getzels and Jackson (1960) reported several studies of giftedness. They summarized their findings thus: "(1) Although teachers and parents defined the gifted child in the same terms, teachers appear to *want* gifted children in the classroom; parents appear *not* to want them in the family; (2) The relationship between qualities defining giftedness in children and qualities believed to be essential for success in adult life is *nil* for teachers, somewhat higher but still low for parents; (3) The personal aspirations of children themselves are generally *unrelated* to their teachers' and parents' definitions of giftedness."

Additional Reference: Bishop (1959).

Some Strategic Areas for Research in the Sociology of Education

Review of the current literature makes clear that dramatic changes in methods and techniques of studying educational institutions have occurred, as well as changes in the content and direction of such research. Not only have sociologists taken educational institutions as a subject of investigation, but they have arrived at that position which Durkheim many years ago defined as the proper place of the sociologist who chooses education as his speciality. Durkheim saw the sociologist as the analyst of continuing human behavior and considered it his function to explain current social phenomena; he thought the "pedagogist" should be occupied with bringing about changes within the educational system. It is the authors' belief that this is the way it should be.

As for research to be done, the following areas seem particularly fertile—though, of course, the selection necessarily reflects the choosers' interests and values:

1. Longitudinal analysis of the socialization process in educational institutions. The aim of this research should be (a) to understand and articulate the procedures by which values, attitudes, behavior patterns, and career intentions are changed as the student progresses and (b) to find out what aspects of the educational system are involved in this socialization—faculty, peer group, curriculum, or general institutional climate. Panel analysis is specifically recommended since the research which has used only cross-sectional data has done little to explain the dynamics of student socialization.

2. Studies of student and faculty value systems. Here the aim should be to determine what aspects of student and faculty climates aid or hinder the learning process. There is a need to know more about student expectations and intentions, and how they are related to the expectations and intentions of the faculty.

3. Studies in comparative education, an area where there is little systematic and empirical knowledge. There is need to go beyond surveys. There is a need to observe how differences in cultural background and values lead to differences in what is taught, how it is taught, and how it is absorbed by students.

4. Research on the emergence of educational institutions. The growth of institutions in American society as well as in others provides an ideal opportunity to find answers to a variety of questions: How does the educational system originate? What is there in its origins which determines the direction taken by the specific school organization? Who plays the crucial role in evolving the academic climate which will prevail?

5. Investigations of the impact of social-class background upon educational achievement and motivation. The abundance of research in this area is largely speculative in content and method. Recent investigation indicates that results of some early studies were influenced by the types of measurement used as well as by the samples employed.

6. Interdisciplinary research. No single social-scientific discipline commands all the proper tools and hypotheses required to explain human behavior within the school system. The time has come for combining ideas and methods. The incorporation of psychological insights, learning measures, social-psychological propositions, and social-anthropological techniques could go a long way toward answering questions which have baffled scientists in each of these fields.

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CHAPTER IV

Comparative Education*

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COMPARATIVE education, an interdisciplinary approach to the relationship of schools to the societies they serve, has received international recognition for new, significant contributions to already established methods of studying education. The disciplinary approaches of comparative analysis are necessarily those of philosophy, history, sociology, and anthropology, and often those of political science, economics, and other disciplines as well—and comparative analysis in education inevitably adds a third dimension to the existing complexities of interdisciplinary study of education. It is, therefore, not surprising that debate persists over fundamental matters of purpose, limitation, and methodology of comparative education, despite the use of the comparative approach in the past.

There is virtual consensus among scholars that Marc-Antoine Jullien's "Équisse et vues préliminaires d'un ouvrage sur l'éducation comparée," Paris, 1817, is the first publication whose purity and focus justifies its being considered comparative. Among important contributions to the field during the nineteenth century are the formidable works of Henry Barnard, Horace Mann, and later, Matthew Arnold and Sir Michael Sadler. The construction of a formal discipline continued in this century with the addition of the highly important works of Isaac Leon Kandel, Nicholas Hans, Friedrich Schneider, and Robert Ulich. Within the last decade a notable development facilitating the growth of the discipline was the formation of the Comparative Education Society in April 1956 and the issuance of its official publication, the *Comparative Education Review*, beginning in June 1957. The society serves as an agency to provide opportunities for the formulation of definitions, the discussions of methodological developments, and the exchange of research information necessary to achieve the agreement of purpose and approach necessary for a formal discipline.

Periodicals

Comparative Education Review

Studies appearing in the *Comparative Education Review* are of four main types: reviews of the literature; articles concerned with history,

* This first chapter on comparative education to appear in the REVIEW deviates from the usual organizational structure in order to highlight for the reader the location of prime work in the area and to indicate the general nature of what is to be found in these sources. Those seeking references on particular areas or countries will find these have been carefully indexed.

methodology, and goals of comparative education; area studies of education in one country; and studies of a single problem or issue using two or more countries as models. Reviews of the literature appear both as editorials and as articles.

Brickman (1960), in an introductory history of comparative education, treated many details of its development which had been previously overlooked. Ulich (1957), in an essay on definitions, treated many critical questions: (a) When does education, in its broadest sense, begin? (b) What agencies are educational? (c) What are the time limits of historical analysis of a contemporary problem?

Bereday (1958), in a methodological article, outlined programs and courses in comparative education at several institutions and defined three main approaches to study: (a) the area approach, which is not truly comparative and is limited to study of one geographical area though it goes beyond mere description of an educational system; (b) the problem approach, which focuses on a particular issue and cuts across systems of education in truly comparative perspective; and (c) the total approach, comprehensive in scope and truly comparative, which permits depth expansion of several systems of education in a complex of problem analysis and area description within the methodological framework of history, sociology, economics, and political science.

Holmes (1958) made suggestions for reconciliation of the controversy over whether the focus of research in comparative education should be on practical application or theoretical objectives. He argued convincingly for the problem approach as an effective methodological solution, maintaining that this approach "represents an attempt to make the study of education scientific" and that such study is possible through careful analysis of problems and social patterns. Rossello (1960), discussing goals and purposes of comparative education, observed the unsatisfactory rate of progress of explanatory comparative education in relation to progress in descriptive education and pointed out the importance of the dynamic qualities of the explanatory aspect as an effective instrument of planning.

The problem approach to comparative analysis was used in studies dealing with church-state relations and education, nationalism and education, and contemporary reforms in education. Hans (1958a) believed that differences in the relationship of the Roman Catholic Church to education in Italy and in France are explainable in part by the more intense historical Catholic influence in Italian culture. Maintaining that Catholicism is part of the Italian "national character," he saw it inevitable that church influence in French education should be less than in Italian education, inasmuch as "in France . . . avowed anti-clericals and atheists remain essentially French." In another article, Hans (1958b) contended that educational problems created by nationalistic movements in Asia are attributable to the many distinctly different linguistic-cultural communities within the borders of the new states. Hans posed the question of successfully solving

the problem of agreeing upon a satisfactory, modern medium of instruction through democratic processes which these Asian countries have inherited from the tradition of previous colonial government.

Scanlon (1960), in an analysis of the German Rahmenplan and the Italian Ten-Year Plan, observed that: (a) both are commitments to large financial expenditures, but the Italian plan, since it involves massive construction of new schools and not only "rebuilding," seems unrealistically ambitious; (b) neither plan reveals a sincere desire to remove elitist elements in a traditionally selective school system; (c) Italian reforms must contend with a more extensive system of private schools; (d) the Italian plan contains financial provision for development; (e) the Italian plan is more comprehensive, largely because of urgent economic necessity; and (f) the Rahmenplan appears to be an outgrowth of contemporary social movements, a manifestation of middle-class demands for equality of educational opportunity, whereas the Italian plan seems to be imposed by the liberal intelligentsia.

Area studies inevitably dominated the first volumes of the *Comparative Education Review*. Most were analytical. Low's (1958) article, although written before the current tensions in Africa, was important to the study of race issues in education. Eckstein (1959) offered a particularly insightful analysis of recent trends in British education and the relationship of such trends to social and economic change. Kazamias (1960) briefly but skillfully analyzed problems of postwar educational reforms in Greece. Other area studies were concerned with description and analysis of educational trends and practices in Africa south of the Sahara, Ethiopia, Southern Rhodesia, the Arab countries, Iran, Israel, Communist China, Indonesia, Japan, Hong Kong, the U.S.S.R., Belgium, France, Germany, Greece, Italy, the Netherlands, Brazil, Guatemala, and other countries of South America.

Other Periodicals

A special issue of the *International Review of Education* was devoted to problems and issues in the field of comparative education. Among essays in this issue which deserve particular attention are those of Kandel (1959), Lauwerys (1959), and Hans (1959). Kandel emphasized the need to link methodology with the purpose of studies and contended that, in order to discover the forces which have created an educational system, a student must have training in at least one basic discipline, language facility, and travel experience. Lauwerys pointed out that comparative analysis inevitably is colored by the prejudices of the analyst and observed that freedom and objectivity in comparative research may be better served by a less deliberate and less explicit approach. Hans maintained that the totality of the historical approach allows broader and deeper analysis of community and national interests than more concentrated focuses.

School and Society, edited by William W. Brickman, contained many studies of special interest, among them those of Fisher (1959), Pidgeon (1959), and Parker (1960a).

The *Phi Delta Kappan*, which frequently publishes articles about foreign education, prints special issues sponsored by the Phi Delta Kappa Commission on International Education. Particularly useful special issues were those edited by Elam (1960) on Africa and Elam (1957) on Asia. Each contained a collection of studies prepared by specialists, and the range extended from broad descriptive articles to analytical problem studies.

The *Teachers College Record* contains articles on developments in foreign education. Bereday and Rapacz (1958), excerpting and analyzing two important Khrushchev pronouncements on education, which appear in excerpt form in the article, suggested that a combination of social, political, and economic forces have shaped Soviet school reform. In an issue containing several international articles Bigelow (1959) treated some British conceptions and misconceptions about American education.

Among the many significant contributions to studies in comparative education in the *Harvard Educational Review* were those of DeWitt (1960) and Valenti (1959), which treated the problems of reform movements in education. DeWitt analyzed the current Soviet school reform in the historical perspective of the development of polytechnical education. In an excellent, but brief, appraisal of the prospects of the reform, he pointed out possible and probable difficulties to be encountered by Soviet education in solving problems of equipment shortage, co-ordination of instruction among teachers and factory technicians, and legal barriers to employment of juveniles. Valenti, in a penetrating analysis of events leading to the present reform of French education, outlined the Billières and Berthoin proposals adopted by the DeGaulle government.

Interest in Soviet education generated demand for translations of original Soviet sources. A number of publications appeared which, in part, satisfied the needs of those not equipped to use original sources and those seeking digests, surveys, and selections of Soviet educational literature. *Soviet Education*, a monthly edited by Yanowitch and published by the International Arts and Science Press, is composed of literal translations of articles selected from eight major Soviet educational journals and, occasionally, a newspaper. An example is a report by Afanasenko (1960), RSFSR Master of Education, which had previously appeared in the popular Soviet magazine *Sovetskaya Rossiya* of July 7, 1960. In this revealing report to the All-Russian Teachers Congress, Afanasenko disclosed considerable shortcomings in the implementation of reform in Soviet education.

The British publication, *The SCR Soviet Education Bulletin*, is more modest in its offerings. Published quarterly by the Society for Cultural Relations with the U.S.S.R., it also contains translations of selected articles from Soviet publications. Recent issues have been concerned with the central problem of school reform. For example, one entire issue consists of a translation by Melnikov (1960), Soviet expert in polytechnical educa-

tion, of an article which appeared in *Sovetskaya Pedagogika*, No. 1, 1959. Melnikov explained, in detail complete with charts and tables, the curriculums and syllabuses of the new Soviet eight-year school.

Students of comparative education with particular interest in Soviet education are provided with excellent research service in the *Current Digest of the Soviet Press*. This lengthy, weekly publication (up to 50 pages of double-column fine print) contains translations of complete texts and excerpts from articles selected from an extensive list of Soviet newspapers, magazines, and journals. Articles cover a broad range of subjects useful in interpreting many aspects of Soviet life—education, government, law, foreign affairs, arts and sciences, economics, industry, transportation, and trade. The school-reform law enacted by the U.S.S.R. Supreme Soviet (1959), which appeared in *Pravda* and *Izvestia* on December 25, 1958, was printed in complete translation in the March 4, 1959, issue of the *Current Digest of the Soviet Press*.

Among other periodicals useful to comparative educators are the *Journal of Educational Sociology*, the *Journal of Teacher Education*, the *Journal of Higher Education*, *Clearing House*, *Educational Forum*, and *School Review*.

Additional References: Anderson (1959); Belding (1959); Blanquat (1959); Elvin (1960); Harap (1960); Kaulfers (1959a, b); Klein (1960); McCain (1960); MacFarlane (1959); Niblett (1959); Nutting (1959); Read (1960); Shaw (1958); Williams (1959); and Wood (1959).

Textbooks in Comparative Education

Kandel's (1955) outstanding position in comparative education rests in no small part on his *New Era in Education*. This volume is a condensation, revision, and modernization of his original pioneering work published in 1933. He undertook to analyze and compare the educational theories and practices of different nations in terms of underlying cultural foundations. The content and methodology took a modified problem approach, the problems being broadly cultural or specifically educational. The relationship between the state and education, for example, was discussed from the points of view of authoritarianism, democracy, freedom, and authority; patterns of culture in the home, technology, nationalism, and equality of educational opportunity were other topics providing an angle of vision. Specific educational problems in England, France, the U.S.S.R., and the United States were analyzed and evaluated sequentially: administration, education of the child, the adolescent, and the preparation of teachers.

Kandel recognized that formal educational systems are formed and function in dynamic interaction with social, political, and economic forces which operate within a cultural matrix; to understand this dynamic requires more than a facile repetition of the term *culture*. Kandel provided a model

upon which later students, who will have available the resources of more fully developed theories of the culture-concept, will be able to build deeper insight for useful prediction and evaluation.

Hans (1951) wrote the comparative-education text which has become standard in the English language. It discussed problems of race, language, and religion along with economic, intellectual, social, and political factors affecting education, and included descriptive studies of the educational systems of England, France, the Soviet Union, and the United States.

Cramer and Browne (1956) emphasized the importance of studying educational systems of other nations in order to improve one's own. Their book comprised a brief statement of the influences affecting the character of national systems of education, such as sense of national unity, general economic situation, and fundamental traditions; a description of the administration, control, finance, organization, and operation of school systems in the United States, England, France, Australia, Canada, and the Soviet Union; a discussion of UNESCO's work; and an analysis of educational problems in selected Eastern nations and in postwar Germany and Japan. Area study and problem approach were combined. Critical analysis and synoptic interpretation to help improve American education were left to the reader.

Mallinson (1957) adopted the problem approach to show how educational systems of Western Europe, America, and the Soviet Union have responded to common challenges. The first part of the book deals with the purpose of education, education and national character, historical, natural, and social determinants of national character, modern theories of education for living, and varying national aims in education. The second part includes analysis of the various national systems in forms of administration, teacher training, and the organization and content of primary, secondary, and vocational schools. The appendix contains seven diagrams of European systems and a selected bibliography.

King (1958) employed a narrative style to give a lively and sympathetic impression of education as intimately interwoven with cultural process. Thus he tried to overcome the inadequacies of conventional area studies and of the common problem approach which have failed to convey the *mystique* characteristic of each nation's way of life as expressed in its educational theories and practices. The book contains synoptic descriptions of education in six countries, each chosen for a significant reason: the United States as the source of automation; France as the guardian of intellectualism; India as an underdeveloped nation trying to industrialize and modernize; the U.S.S.R. as a totalitarian model; Denmark as a small country which has achieved a high urban civilization; England as the example of democratically evolving socialism. Although King offered a more literary and less systematic description of education in his selected countries in order to convey empathic understanding, he recognized that comparison for purposes of scientific prediction or philosophical evaluation remains as a goal for the professional comparative educator.

Bereday (1957) reviewed textbooks, including works by Cramer and Browne, Hans, and Kandel. Lilge (1959) reviewed King's (1958) text.

Additional References: Mochlman and Roucek (1952); Meyer (1949); Orata (1954).

Books

Area studies in book form have appeared sporadically, their topics often determined by un-co-ordinated interests. Consequently, many areas have been totally ignored or have received only superficial attention. Recently, patterns of developing area studies have emerged which may establish a precedent. Studies within the framework of these patterns have demonstrated a sensitivity to the need for analysis of social, economic, political, and philosophical forces which act vectorially to shape a system of education. The need for travel experience, language facility, and the use of disciplinary tools of comparative education have been recognized in these studies. For such reasons, these recent works represent a comparative approach to area study which distinguishes them from the descriptive, empirical, and somewhat necessarily aseptic approach of international studies which have previously served to collect data and information on education around the world. Among these recent attempts to co-ordinate comparative study are: the University of Pittsburgh Studies in Comparative Education; the Kappa Delta Pi International Education Monographs; the Teachers College, Columbia University, series; and the Comparative Education Society Field Studies.

The Pittsburgh series is represented to date by these works: Everett (1959), a study based on observations of teaching practices, curriculum, student activities, and administration in English secondary schools; Counts (1959), an analysis of the significance and meaning of the Party Thesis in shaping the recent Soviet school reform; and Huus (1960), a description and analysis of Norwegian education. The Teachers College, Columbia University, series has provided several important area studies. Antonakaki (1955) prepared a particularly thorough area study of Greek education with emphasis on historical, intellectual, and social forces which must be considered in reforming administrative procedures and organizational structure in order to meet needs arising during the transition from an agrarian to a modern industrial nation. The Kappa Delta Pi monographs are the reports of international fellows appointed each year. Justman (1959) was the first to study Italian education in a cultural perspective, and Parker (1960b) treated African development and education in Southern Rhodesia.

The Comparative Education Society field study of Soviet education was one of an abundance of studies on this subject. This team approach to area study co-ordinated the research of more than 70 specialists in virtually all aspects of education. The report was edited by Bereday, Brick-

man, and Read (1960). The first part of the volume is concerned with the foundations of Soviet education; the second with description and analysis of general and higher education; and the third with special aspects of education, among them education of exceptional children and moral education in a collectivistic society.

Other studies of Soviet education included a timely publication, the U.S. Department of Health, Education, and Welfare (1957) bulletin on Soviet education. By carefully descriptive, although elementary, appraisal of Soviet accomplishments, it helped offset rash estimates of Soviet success in eliminating problems. Although useful for understanding the structure and practices of the 10-year school, this publication failed to give significant attention to the tensions in the Soviet Union which were to give rise to the revolutionary school reform. A later U.S. Department of Health, Education, and Welfare (1959b) publication compensated for (in part) and repaired this weakness.

Bereday and Pennar (1960) supplied an analysis of the political, social, and economic factors which have structured the Soviet educational apparatus. The volume, a collection of essays by an international group of specialists, is an effort, developed in a seminar at the Institute for the Study of the U.S.S.R. in Munich, to constructively repair weak points in previous analyses of Soviet education. Another source of information useful to readers who do not read Russian is the publications of the Foreign Language Publishing House of Moscow. Written largely for external consumption, the publications are infected with Soviet ideology, but some are particularly useful. One of these, a collection of articles and speeches by N. K. Krupskaya (1957), offered a glimpse of the thoughts on education of V. I. Lenin and his wife Krupskaya, which have been thrust again into prominence in the present reform movement.

Publications of various foreign ministries of education, printed in English for export, moved perceptibly toward an analytical approach in descriptions of education in their lands. Among such studies, oriented toward an appreciation of the foundations of education, was the Hove (1958) outline of Norwegian education. In countries recently emerged as national entities, serial works appeared which reflected pride in new cultural developments and in the creation of a sense of cultural unity. It is not surprising that a volume on education was included in a series on the accomplishments of the state of Israel. Avidor (1957), in this most readable treatment of the development of Israeli education, described its progress in the context of three outstanding achievements: the absorption of immigrant children into the school network, the spread of Hebrew, and the cultural absorption of newcomers to the country.

World Surveys and International Studies in Education

UNESCO published the first volume of its *World Survey of Education* in 1955; it contained descriptive information up to 1954 on national

school systems. The second volume (1958) was devoted to information about primary schools. Volumes covering secondary and higher education are contemplated. The International Bureau of Education, founded in 1925 to promote international co-operation by gathering and disseminating information on education, publishes a bulletin containing brief reports on education around the world. This quarterly contains a bibliography of selected new books added to the International Education Library in Geneva.

The United Nations (1957) studied discrimination and inequality of opportunity in education based on race, color, sex, religion, social origin, and property, whether *de facto* or legalized. The American Council on Education (1950) published information on more than 2000 institutions of higher education in more than 70 countries other than the United States. Sasnett (1952) presented information on the schools of 78 nations, information on how to build a foreign evaluation desk, and bibliographical references for each country.

Yearbooks

The Institute of Education, University of London, and Teachers College, Columbia University, have jointly prepared the *Yearbook of Education* since 1953. Each year it has dealt with a major educational problem common to many nations and contained articles by selected national authorities. Topics covered include status and position of teachers, education and technological development, guidance and counseling, education and economics, and philosophy and education.

One volume edited by Bereday and Lauwerys (1958) focused on secondary curriculum, a topic particularly sensitive to the conflict between those demanding that public education serve an increasingly large segment of the population according to individual abilities, ambitions, interests, and talents, and those defending theories and practices of traditional curriculum.

The subsequent volume, also edited by Bereday and Lauwerys (1959), presented a series of articles on selected aspects and problems of higher education. Studies of the evolution of universities in Austria, England, Australia, the United States, Latin America, and Yugoslavia indicated gradual modification of historical emphasis on scholarship for its own sake. Studies of education in Sweden, France, Brazil, Great Britain, and the United States revealed new curriculums introduced to prepare personnel for business, education, and industry. Other area studies examined relationships between responsibility, control, administration, and finance in terms of their significance for academic freedom. The relation of institutions of higher learning to other educational and social institutions was the topic for the final section of this volume.

The International Bureau of Education has published its *International Yearbook of Education* each year since 1933, except for the five years

1940-45. The most recent volume (1959) followed the established pattern by providing a comparative study of educational progress during the year in various countries in administration, free compulsory education, primary education, secondary education, vocational education, higher education, and teaching staff. This volume also included national reports from 77 countries, lists of leading officials in the ministries of education, and educational statistics. The U.S.S.R. report indicated changes following its reform of December 1958.

Bibliographies

Education Abstracts published by UNESCO offered bibliographical materials and research abstracts on education throughout the world. Information concerning research organizations was provided in directory form. Some issues treated research and bibliographical materials by area, one issue being devoted to a single country.

The U.S. Department of Health, Education, and Welfare published its extensive annual bibliography of works in comparative and international education (1959a), listing items by broad geographical areas and by countries. Useful annotations accompanied each entry.

Conclusion

The mass of publications concerned with comparative and international education has increased in geometric proportion each year since World War II. There is little doubt that improved means of communication and transportation contributed to increased interest in education in foreign countries. The growth and strength of international organizations in the last decade provided the administrative mechanism for exchange of descriptive surveys of world education.

It can be seen from this review that truly comparative works were mainly written through individual scholarly effort. Large organizational efforts through ministries of education or similar national groups must contend with the limiting force of ethnocentrism. Supranational organizations must contend with national sensitivities and consequently were limited largely to descriptive rather than analytical or critical works.

Comparative education has served to alert all who deal with education in foreign lands to the importance of transcending mere description and approaching the study of education in a broad cultural perspective.

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CHAPTER V

Anthropology and Education

THEODORE BRAMELD and EDWARD B. SULLIVAN

ANTHROPOLOGY and education still maintain a tenuous relationship. Communication between the two fields is more sporadic than between, say, psychology and education.

Consequently, certain limitations to this chapter must be stressed. Because of the sparse quantity of relevant research and the obvious gropings for organized approaches to educational anthropology (a term as yet anathema to many anthropologists and to some educators), the arrangement of topics is arbitrary; most writings could be included under any one of several headings. Because this discussion is addressed primarily to educators, the writings it notices are limited to those that refer directly to the school—culture's formalized part of the enculturative process.

There is, of course, a great range of anthropological literature that is implicitly of immense value to education. This is especially true in the area of culture and personality; Honigmann (1959), for example, gave the subject of personality formation considerable attention. Also, anthropology constantly bears on the whole complex area of child rearing, and some investigation which can properly be termed anthropological is done under the auspices of schools of education; Stephens (1959) is a good example.

Since educational anthropology as a field of study has not hitherto been included in this REVIEW's reports of developments in the foundations of education, a few studies earlier than 1958 are cited. Of particular importance is the pioneering symposium conducted at Stanford University, in which anthropologists and educators endeavored to communicate their common concerns, reported by Spindler (1955).

Anthropological and Educational Theory

Granting notable exceptions, anthropologists are not conspicuous for theoretical explorations of the science of culture, and none has yet offered a systematic theoretical approach to the school as a major institution of culture. The few studies that have been made emanate chiefly from educational theorists, the most comprehensive thus far being Brameld's attempt (1957)—an outgrowth of his essay in the Stanford volume cited above—to utilize "culture-theory," with lesser utilization of such fields as the philosophy of history, in developing a systematic philosophy of education. The most searching review of Brameld's book was by the anthropologist Siegel

(1959), who concluded that "it attempts to demonstrate the proposition that 'in the last analysis men are the makers, not the pawns, of their own future'."

Brameld has applied his "anthropological philosophy of education" (1959b) to research in an actual culture. A companion volume (1959a) to his 1957 volume examined and interpreted the educational policies and programs of Puerto Rican culture by means of his chief organizing categories, order, process, and goals. As a preliminary example of his methodology and conclusions, Brameld (1958) tried to show how the concepts of "explicit and implicit culture" can help to explain the consistencies and inconsistencies of a culture with its political and religious values, and how these values and value conflicts are reflected in educational experience. The study concluded with an outline of the philosophy of education which he hopes to see emerge in Puerto Rico.

A briefer but richly insightful interpretation of education by means of anthropological concepts was the Burton lecture at Harvard University delivered by Frank (1959). Reflecting much of the seminal theory he had expressed in earlier books and at the Stanford conference, Frank pleaded for an operational rather than a hypostatic approach to culture, thereby conceiving of education as the creative agent of cultural change.

An equally creative orientation was developed by Montagu (1958), one of the few anthropologists excited about education. Consisting of a series of reprinted articles with considerable overlapping, Montagu's book re-emphasized his well-known views on the co-operative nature of man. Unfortunately, despite its admirable thesis, the book was shown by Brameld (1959c) to be open to severe criticism on theoretical as well as on scientific grounds.

Two articles by Mead (1959b, 1960) had significant theoretical implications for schooling. An anthropologist with vigorous educational interests, Mead sought to redefine education in terms of a "lateral" as well as a "vertical" transmission of knowledge; she argued that, especially in secondary education, informed persons should teach the uninformed, regardless of age. Writing of the future high school, she viewed it as an "adolescent center" with special concern for behavioral stages of development and with much less rigidity with regard to "age chronology" than obtains at present.

A paper delivered before the American Anthropological Association by Grinager (1959) coined the term "educanthropology" to denote the interdependence of both fields. She supported her thesis with an incomplete discussion of the need for closer co-operation between professionals in education and anthropology than is now typical. Illustrative of the hurdles which remain in the way of such co-operation on either a theoretical or a practical level was her confession that she had been cautioned by her anthropological colleagues to "lay off the idea." But, she went on to say, "This I cannot honestly do"—a determination in part justified by the remainder of this résumé.

Education as a Cultural Process

Anthropological research concerned with a culture's educational process, as it serves to perpetuate and/or modify behavior patterns for its members and to internalize appropriate conceptions of themselves, deserves primary attention from educators. Results and implications of this research are fundamental to any changes that educators may hope to effect in any part of the cultural pattern. Through process studies, educators can develop insights helpful in understanding and acting upon some of the intangible factors always present in educational practices: covert relationships between a teacher and pupils and between a school and its community; contradictions between declared goals and real goals in the classroom or in curriculum planning; the effects of powerful cultural forces on personality development, on traditional ideas about classroom authority, and on vexing problems of discipline.

Taba (1957) raised basic questions which educators have seldom seen: (a) What are the cultural sources of the anxieties and emotional threats that beset children during the enculturation process, for which the school is an agent? (b) Can schools formalize cultural variations through curriculum planning? (c) Can schools alleviate anxieties for children who undergo a marked cultural transition from home to school? (d) In what ways has the nature of American culture an impact on personality, and what allowances must educators make? (e) In what ways can schools provide for counterbalancing tendencies toward conformity and repression of personal autonomy in American life?

Spindler (1959a) pointed to an anthropological perspective in learning. He argued that, since virtually all learning is culturally influenced, it is important to discover to what extent the teacher's cultural background is similar or antagonistic to backgrounds represented by students and what means of communication are therefore opened or closed. In his Burton lecture at Harvard, Spindler (1959b) argued that skill in cultural analysis can be developed during the training period and inservice years. Training in culture analysis would use, as its basis, material derived from classroom observation by the anthropologist for the purpose of dissecting and specifying the teacher's personal culture as it relates to the larger American cultural context. Such training, Spindler suggested, is a means of reducing eventually the negative side effects that teachers often create and foster in their attempts to transmit American culture.

Henry (1960) developed an outline of the educational process based upon research on cultural factors in learning. He suggested some of the content which will have to be dissected and specified by the teacher and the anthropologist working perhaps as a team. Although the outline itself, and its rationale and explanation, indicated what the anthropologist must look for, the particular perspective given to what are often considered ordinary teacher and pupil activities reveals for the educator the scope and potentialities of anthropological observation in American classrooms.

Elsewhere, Henry (1957, 1959) reported some of the research upon which his outline was predicated. The teachers who were observed projected their own cultural biases into the unorganized feelings and tendencies of their pupils. Although the factors studied were considerably different in terms of subject and of grade level, evidence seemed to indicate, among other results, that teachers unintentionally encouraged or generated destructive impulses in their pupils, imposed personal or collective docility upon them, fostered competition, and created a classroom atmosphere in which their pupils' anxieties were increased. Although a fairly obscure phenomenon, the "witch-hunt syndrome" was seen as an indication of what happens when a teacher by choice of words, mannerisms, gestures, and manipulative use of materials organizes underlying feelings and tendencies of children into emotional arrangements that are often in contradiction to the teacher's declared goals. Certain conclusions emerged from this study that can be seen to have a relevance to a great many American classrooms: (a) different teachers organize similar emotional characteristics of children to obtain different organizations of emotions; (b) the teacher's greatest skill seems to be a learned capacity to keep altering states of order as the work demands; (c) classroom competitiveness is perhaps unavoidable, but it should not be a destructive force against children while at the same time reinforcing their dependence upon the teacher; (d) teachers must be given opportunity to acquire insights into how they project personal problems into their teaching.

Spindler (1959b) demonstrated how inherent value contradictions in American culture are internalized in teachers, thus frequently thwarting or obscuring their explicitly declared classroom goals. American cultural value patterns might be characterized by a gradual shift from traditional to emergent values; virtues, such as self-denial, success, and hard work, and absolute moral norms are giving way to relativistic moral attitudes, sociability, and group-motivated actions. Teachers usually encounter this shift during their professional training years. Their reactions, depending upon the degree of contradiction between the emergent values and their cultural backgrounds, fall into a variety of categorical definitions of the teacher, support for which is found in teachers' value structures as these are projected into the classroom. The degree of conflict between traditional background values and the emergent value pattern characteristic of professional training fosters personal reactions which run the gamut from a rigid reaffirmation of traditional values by one teacher to a combination of conflicting elements into a reasonable and workable synthesis by another.

Changing American value patterns are noticeable in the shifting concept of authority. Eggan (1959) noted two conditions which are altering radically traditional concepts of classroom authority: the shift in the authority concept from parental models to approval by contemporaries or peers and the increasingly rapid change in cultural goals and world views. Children, Eggan stated, should be treated as potential adults because

discipline is the more effective as it is gradually internalized as self-discipline. In this way the atmosphere of artificial childhood found in many classrooms can be eliminated. Elsewhere, Eggan (1957) suggested a variety of ways in which cultural anthropologists can help educators: (a) through studies of the significance of age-grading, of the influence of peer groups, and of the relation of the school to the larger community; and (b) through studies of teachers—their conceptions of children, informal leadership in their groups, their community status, and their role in parent-teacher groups.

Rosenstiel (1959) also felt it imperative that teachers understand the motivations of child behavior in terms of varying cultural norms. A knowledge of anthropology, she pointed out, can help eliminate ethnocentrism in teachers and pupils, can help teachers to overcome in their own experience many of the obstacles that impede intercultural understanding, and can lead both teachers and pupils toward a spirit of intra-cultural co-operation and trust. Lee (1959) evidenced deep conviction that group experiences are a means for enriching the maturation process of each child; a situation is desired where children can seek personal significance within the structured classroom group.

Once the child leaves classrooms behind, how strong is the motivation to continue developing his capacity to learn? In an attempt to illuminate this question, Lee (1960) referred to the Oglala Sioux and the *shtetl* Jews of Eastern Europe, both of whom placed a high value upon self-motivated, lifelong learning—learning usually based upon certain conceptions about children and under environmental conditions that would not be acceptable to many Americans. For both, the range of cultural alternatives was narrow; excellence within a limited choice of alternatives was not only highly desirable but, perhaps, the best indicator of personal significance. The value system of both groups encouraged and rewarded the questioning mind. And when formal education ended, personal inquiry continued. Values in these societies were consistent and permeated all aspects of life: “. . . in their strength they overcame all possible drawbacks in the educational system.”

A fundamental drawback of American education is that our shifting value system is frequently unrecognized in the classroom. A great problem that educators need to face is how to develop lifelong habits of personal inquiry within a value system which often fails to support the questioning mind. The solution must be arrived at within the value framework that is emerging, not in the one that is passing. Only through emergent values that are even now permeating our culture can means be found of developing in children a permanent capacity for self-motivation to learn. The determination of which values to foster, as well as the determination of other questions raised in this section, requires the combined efforts of philosophers, educators, and anthropologists. Some of the latter are aware, as Kimball (1956) pointed out, that their solid contributions to American education will come only as they work with educators appreciative of

their problems and amenable to their points of view. Most educators have yet to respond.

Anthropology in the Curriculum

The implications of anthropology for all levels of instruction may ultimately cause revolutionary changes in curriculum. As educational-anthropological studies concerned with the many ramifications of American education as a cultural process begin to attract the attention of educators, the need for revisions in the conceptual framework of curriculum planning will become increasingly evident.

In the approach most prevalent recently, cultural anthropology has been considered a *transferral* subject, that is, one whose sources and concepts have implications for other subjects in the curriculum—particularly in the social studies, literature, and languages at the high-school and college levels. Leeds (1960) reported the results of a one-semester program in cultural anthropology for a small, selected group of high-school seniors, all of whom had, for a variety of reasons, failed to adjust successfully to conventional school programs. He concluded that, in addition to its therapeutic value (students were able to view a series of cross-cultural alternatives as a means of achieving potential self-dependency), cultural anthropology appeared to offer transferral qualities helpful in developing both a deeper self and a world perspective.

Ehrlich (1960), agreeing with Leeds that cultural anthropology should be included in the curriculum of selected students, added that the "major integrative function of anthropology lies within its own subject matter," as it progressively develops to a stage where union with history and the natural and behavioral sciences is effected. Kimball (1960b) described the objectives and content of his course, "Anthropology and Education." He was convinced that anthropological content and method have much to offer graduate students, especially in connection with professional morality and teaching skills. Its use within a humanistic and general-education framework would seem to be most effective. The teaching of anthropology on the college level has recently received systematic attention, especially in the series of conferences reported by Mandelbaum (1960).

Social studies, perhaps the weakest area in most elementary and secondary programs and the one where anthropological sources and concepts would be fruitful almost immediately, has been the concern of a number of writers. Under the direction of Joseph Weckler, chairman of the Department of Anthropology at the University of Southern California, a series of conferences during the past three years explored, along with other questions, the place of anthropological knowledge in the social-studies program of California schools. Disagreements emerged, but communication improved. These conferences were reported by the California State Department of Education (1959).

Spindler (1958a) urged that cultural anthropology be included in high-school social-studies programs through a focus on human problems as they center in the nature of cultural values as motivation for different kinds of human behavior. He saw these benefits from such inclusion: realization of the meaning of cultural integration; examination of social institutions in different cultures as they operate to serve similar human needs; acceptance of the idea of cultural change, particularly in those parts of the world where the impact of America and Europe has been greatest.

Elsewhere, in perhaps the most important contribution thus far to the question of anthropology's role in the social studies, Spindler (1958b) commented on the variety of anthropological field studies and their implications. Certain major trends within cultural anthropology itself were seen to be relevant for social-studies teaching: (a) redevelopment of interest in human evolution, in both its biological and sociocultural dimensions; (b) increased interest in the components of human nature; (c) attempts to become more scientific but, at the same time, retain a humanistic outlook; (d) focus on extracting cross-cultural regularities in human actions.

Holmes (1958) believed anthropology can help secondary-school students gain a further understanding of their own way of life and its institutions as well as help create deeper respect for the rights and beliefs of others.

Chilcott (1960) proposed substituting an anthropological approach for the conventional historical and/or geographical approach to the development of man. He proposed a program of the study of cultures, beginning in grade 4, which would provide for the intensive study of one culture a year and eventually of two cultures. The study of each culture would increase in complexity as human development was followed through ancient civilizations and European affiliations, culminating in grade 12 with examination of American value systems. James (1958, 1959) held, however, that social studies should stay within the historical-geographical approach governed by a cultural perspective. Such a perspective could be achieved by considering world areas as "culture areas," where changing ways of life predicate response to a geographical environment, but always in terms of cultural-historical traditions and contemporary problems. Engle (1954) reported that the culture phenomenon suggests a variety of improvements in history programs—notably as a means of linking together the broad sweep and directions of human history, and as a means of focusing history teaching upon current social problems.

Hoffenbacher (1959) described the rationale, objectives, and procedure of a culture-based program in social studies at the Edsel Ford Senior High School in Dearborn, Michigan. The program, which has been in operation for several years, incorporates many of the ideas mentioned in this section. A three-year program examines selected folk societies, considers certain aspects of American culture as it relates to other cultures, and culminates in the senior year in a study of problems of American democracy. Senior students are given the opportunity to "apply the concepts, values,

and generalizations which they have been building up" in previous semesters. Although inconclusive, results thus far revealed that students are looking more objectively at social problems, are more conscious of their nature, and associate them more clearly with their cultural context.

A program of this scope illustrates the point that Lee (1957) emphasized. Though we can go to other cultures to gain insights excluded from our own, other cultures must be studied in their totality. The fragmentation evident in our educational system must not be extended to include piecemeal study of other peoples, a feature which for too long has been a part of American curriculums. Mead's book for children (1959a), if introduced as supplementary reading, could help considerably in dispelling the confusion resulting from fragmented topics and sequences of studies about other peoples.

Brameld, in his companion volumes (1957, 1959a), devoted considerable attention to curriculum planning; for example, he proposed a new design for the whole of general education in terms of the concept of cultural order viewed spatiotemporally. Again, he suggested a series of experiments for all levels of Puerto Rican education based upon his research in that culture, some of them involving both cultural processes and cultural goals.

Further Research

The last two references point to one opportunity for further research, which would utilize, and at the same time radically improve, the models already presented. This research could comprehend not only studies of educational orders in their cultural settings outside the United States but also studies of subcultures—suburban communities, say—within the United States. Since no full-scale anthropological analysis and interpretation of education as a cultural institution have as yet been made in this country, teams of educators and anthropologists could make a pioneering contribution. If such studies were also to become ventures in applied research—in experimenting, for example, with education as an agent of change in culture—so much the better.

Other writings previously cited that suggest further research include Mead's (1959b), Spindler's (1959b), Lee's (1957), and especially Henry's (1960) "cross-cultural outline of education," probably the most fruitful and imaginative attack recently suggested by any anthropologist.

The research constantly being carried on about so-called *primitive* cultures both at home and overseas, as well as about *civilized* cultures in other parts of the world, has, of course, an almost infinite potentiality for contributing to education (Kimball, 1960a). Thus far, however, its findings are almost entirely ignored by educators. The anthropologist cannot relate the research to education for them; they will have to learn how to use the findings themselves. But they are likely to do so only when and if schools of education become aware of the great contribution that anthropology can and should make to both their undergraduate and graduate programs.

CHAPTER VI

Socialization Processes and Education

ELMER VAN EGMOND

SELECTION of items for inclusion in this review was guided by a desire to represent general trends in research activity in the field, new directions of investigation, and unique or innovative methodology. The area of socialization is considered first; then delinquency as a major breakdown in the socialization process. Following this the school as an agency of socialization is considered from the point of view of the teacher and the culture of the classroom. The final section is concerned with the effects of mass media of communication.

Studies of Socialization Processes

Cultural Milieu

The socialization practices of parents have been found to be influenced by social and economic factors and factors involving personal background. Several studies have demonstrated that the values and practices of child rearing vary with the social class of the family. Miller and Swanson (1958) observed distinctive child-rearing patterns of families which they classified as "entrepreneurial" and "bureaucratic." They contended that the meaning of social class has changed so that differences in characteristic patterns of family structure and socialization are related to whether the father's occupational position depends on formal training or personal characteristics. Their findings, based on interview data collected as part of the Detroit Area Study, indicated that entrepreneurial parents emphasize self-control, self-denial, and active and independent behavior. Bureaucratic parents tend to foster dependency and passivity and to encourage their children to spontaneous impulse expression. Similar differences in child-rearing values along traditional class lines were reported by Kohn (1959). He found the values of middle-class parents to center around internalized standards of conduct, whereas the values of working-class parents centered around qualities that assure respectability.

A possible reason that social class differentiates child-rearing practices grows out of White's finding (1957) that different classes used different reference groups. Middle-class mothers mentioned experts, other mothers, and friends as sources of ideas about child rearing. Their own parents, when mentioned, were generally a negative reference. Lower-class mothers tended to rely on their own backgrounds and upbringing, using their parents

as a positive reference group. The differential reference to expert opinion and prevailing opinion was corroborated by Bronfenbrenner (1958). In a re-analysis of studies of social class and child-rearing practices, he found (particularly for the middle class) a remarkable correspondence between expert opinion and reported behavior.

Family Relationships

Using adolescent reports of parental adjustment, Nye (1957) found mother-father tension related to such factors in child maladjustment as psychosomatic illness, delinquency, and strained parent-child relationships. Unhappy, unbroken homes were found to produce more disturbance in children than broken homes or happy, unbroken homes. Peck (1958) studied relationships between adolescent personality and the general climate of the home by means of intensive, longitudinal data. Democratic family atmospheres were found to produce characteristics of friendliness and spontaneity, whereas severe, autocratic family atmospheres were associated with a hostility-guilt complex.

Measures of power relationships in the family were obtained by Wolf (1959) through responses of wives who were asked whether they or their husbands decided each of eight important family matters. Father dominance was associated with high social status. The authority of the wife increased with age and size of the family, and marital satisfaction was reported to be highest in families in which authority was shared by husband and wife. In a matched sample of working and nonworking wives, Hoffman (1960) found that working mothers participated less in household tasks than nonworking mothers and that they had more power than nonworking mothers. Comparing patterns of paternal and maternal authority and affection in two generations of families from the California Guidance Study, Bronson, Katten, and Livson (1959) reported that parental role differentiation within the family is shifting toward greater relative importance of the mother as the agent of discipline, especially for boys, the father becoming increasingly less authoritarian and more affectionate.

Relationships between socialization and differential parental power and domination are reported in several studies. The indications of a shift in parental authority from husband to wife have particular relevance to the findings of Strodbeck (1958) and Rosen and D'Andrade (1959). In their studies of familial origins of need-achievement, the matriarchal type of home was found to provide optimal development of the motive to excel. Among middle-class mothers of eight-year-old boys, Winterbottom (1958) found significant relationships between the need-achievement scores of boys, teachers' ratings of achievement, and the child-rearing orientations of the mothers. From reports of adults recalling their childhoods, Kohn and Clausen (1956) observed that boys tended to prefer the dominant parent and girls the nondominant parent as identification models. Linkage

between mother dominance and maladjustment is implied in their finding that mothers of schizophrenic patients controlled more family decisions than did mothers of normals.

In a sample of 27 male college students, Mussen and Kagan (1958) compared extreme conformists to extreme independents and found extreme conformists tending to perceive their parents as harsh, punitive, restrictive, and rejecting. Their data, based on *Thematic Apperception Test* responses and individual observations in the Asch conformity situation, suggest that tendencies toward conformity are manifestations of basic personality structure and are influenced by early parent-child relations.

The research on differences in parental behavior in terms of sex, which was reviewed by Brim (1957), indicated a tendency for parents to be relatively strict and severe with a child of the same sex, more affectionate and less severe with a child of the opposite sex. Kohn (1959) found these differences in parental attitude and behavior toward boys and girls to be most pronounced at lower-class levels, decreasing with rise in socioeconomic level. From an analysis of responses in a sentence-completion test of 3000 children from grades 3 through 12, Harris and Tseng (1957) found mothers regarded more positively than fathers. High-school-age girls, however, showed more positive attitudes toward their fathers than toward their mothers. Hawkes, Burchinal, and Gardner (1957) found mothers to be favored over fathers in a sample of 730 fifth-grade children. Boys reported less satisfactory relations with parents than girls; however, a considerable degree of involvement in family activities and of satisfaction with family relationships was indicated.

Results obtained by Schacter (1959) showed similarity between parental treatment of first-born children and parental treatment of children of the opposite sex. In a comprehensive study of differences between first-born and later-born children, it was found that first-born children received more attention, were more likely to experience discipline directed toward developing internalized controls, and became more anxious and dependent than later-born children. Later-born children tended to become more aggressive and self-confident than first-born children.

Cross-generational differences in attitudes and values were studied by Hess and Goldblatt (1957) by means of ratings from 32 adolescents and 54 parents. Their findings indicated that adolescents see greater status differences between the two generations than parents do and that adolescents tend to idealize the adult role and feel that their achievements are not recognized or appreciated by adults.

The assumptions regarding the deleterious effects of mother deprivation were challenged by work in two different settings. Dennis and Najarian (1957) reported on behavioral development of children reared in a foundling home in Beirut where mothering and adult-child interaction were minimal because of understaffing. After essentially normal development during the first two months, deceleration occurred and continued to the age of twelve months; but at ages from four and one-half to six

performance approached normal levels. Studies of children raised in the *kibbutz* (Israeli collective settlement) indicated a lack of enduring harmful effects on their development. Comparing *kibbutz* and non-*kibbutz* Israeli children on a variety of tests, Rabin (1958a) found that *kibbutz* infants showed a lower level of ego development than the control group but that ten-year-olds were superior in ego and intellectual factors as judged by tests of social and interpersonal responsiveness. Rabin (1958b) also found responses to the *Blacky Test* to indicate that ten-year-old *kibbutz* boys manifested less sibling rivalry and less Oedipal intensity than control boys, but showed weaker father identification.

Methodology

A detailed account of assessing maternal attitudes toward newborn infants by observational techniques was presented by Levy (1958). A mother's reactions to, and interactions with, her baby were observed in the hospital setting from the time the baby was brought to her until it was taken away by the nurse. Each distinct maternal response constituted an observational unit.

Harlow (1958) devised an experimental approach to the problem of parent-child relationships by using young monkeys separated from their mothers and providing surrogates for nursing. Two types of artificial mothers were employed, one covered with sponge rubber and terry cloth, the other with wire mesh. The animals' increasing responsiveness to the cloth mother, in general and under conditions of fright or in new situations, provided some support for the assumption of the importance of physical contact with the mother.

A critical review of the methodological problems and conceptual ambiguities of parental-attitude questionnaires and scales was provided by Bell (1958). Suggestions for coping with some of the problems were incorporated into the *Parental Attitude Research Instrument (PARI)*, which consists of 23 subscales of five items each. Satisfactory test-retest and internal consistency reliabilities were reported by Schaefer and Bell (1958), but they did not include validity data. Zuckerman and others (1958) assembled normative data for the *PARI* and reported a factor analysis which yielded three factors: authoritarian-control, hostility-rejection, and democratic attitude toward child rearing.

Sussman and others (1958), in a series of papers on methodological concerns in family research, discussed use of internal checks on the reliability of interview data, individual personality as it relates to marital behavior, and observational techniques.

A handbook of methodology edited by Mussen (1960) presented a comprehensive coverage of research techniques applied in child study and should serve as a valuable reference and guide for research activities. The last two sections of this volume are of particular relevance. Part IV deals

with the field of personality development, and Part V with the social behavior and environment of the child.

Juvenile Delinquency

Theories of Causation

Problems of behavior contrary to societal norms were approached from several theoretical points of view. Bordua (1960) discussed the major sociological and anthropological theoretical orientations to the problem of delinquent behavior, identifying the major approaches in terms of causation: (a) delinquent subculture as arising from "status deprivation" and "status punishment" of lower-class male adolescents; (b) lower class as a subculture possessing conduct norms and values which contradict those of other subculture groups that dominate the social structure; (c) adolescent street groups and gangs as arising out of a need to create and maintain a set of status criteria, which need develops because of the inability of adolescents to share in the rights and privileges of adults; and (d) the inability of law-abiding elements to construct and maintain effective social control of youth in many urban areas.

Moles, Lippitt, and Withey (1959) pertinently reviewed and discussed different theoretical viewpoints concerning causation of juvenile delinquency. They abstracted studies which set forth such viewpoints and organized them according to theoretically important causal conditions or sets of conditions. They evaluated each study in terms of environmental conditions, intrapsychic states and processes which imply behavioral effects, and generalizations of major findings or conclusions; their critique pointed out important contributions and limitations. Glueck (1959) compiled an eclectic collection of commentary on the causes, treatment, prevention, and legal aspects of delinquency that represented a variety of theoretical points of view and disciplines but emphasized legal, social-agency, and welfare aspects of the problem. Previous publications of the Gluecks were well represented in the collection.

Primarily for the lay reader, Kvaraceus and Miller (1959) outlined delinquency causation by considering differences in personality and cultural systems. The work gives considerable emphasis to the ideas of Miller, who emphasizes the focal concerns and influences of lower-class culture. The lack of precise definitions resulted in a want of precision generally, and the omission of a bibliography prevented reference to sources of ideas—both shortcomings which limit the usefulness of the work.

The Family and Delinquency

Testing a theory of social control, Nye (1958) studied students in grades 9 to 12 and their families in three small cities and a comparison

group in a state correctional institution. Findings indicated that the condition "happiness of the marriage" is more closely related to delinquency-nondelinquency than whether the marriage is original, broken, or a remarriage or whether a child is living with one parent. There was a greater relation to delinquency in the case of the child rejecting the parents than that of the parents rejecting the child. Socioeconomic status was not generally related to delinquent behavior; the incidence of delinquency was nearly as high among the upper class as among the lower class.

From the Cambridge-Somerville Youth Study, McCord and McCord (1958) analyzed records, compiled over a five-year period, of 253 boys from the age of 7 to 21. Criminal records of these individuals as adults were examined. Focusing on three interacting variables in the familial environment of the boys (the role model of the parents, the attitudes of the parents toward the child, and the methods of discipline used by the parents), they found a significant relationship between paternal deviance and criminality among sons. A further finding indicated that the effect of a criminal father on criminality in the son is highly related only when associated with rejection, maternal deviance, and erratic discipline practices. The findings cast doubt on some of the popularly held notions based on the idea that deviant behavior in children results from identifying with the father and modeling after his behavior. Evidence is also provided that children's behavior can be affected by parents' conscious values even though the actual behavior of the parent may contradict these values.

Relationships between factors in family background and delinquency were studied. Bandura and Walters (1959) investigated the parental antecedents of aggression in a sample of 26 delinquent boys matched with controls by age, intelligence, and fathers' occupations. Findings indicated a basic lack of affection in the families of aggressive boys, the relationship with the fathers being especially significant. Fathers of antisocial boys tended to be cold, harsh, and punitive. Also comparing delinquents with nondelinquents, Kvaraceus (1958) found the background of delinquents characterized by erratic, extremely harsh or lenient discipline, and emotional conflict in the home. School behavior of delinquents was characterized by a dislike for school and lack of interest in school work, failure in school, truancy and early leaving, failure to participate in extracurricular activities, and lack of success in out-of-school activities.

The School and the Socialization Process

The Teacher

Considering the central role which teachers occupy in the socialization process, the limited amount of systematic research regarding their impact on the lives of youth is surprising.

Analyzing the influence patterns of a large sample of social-studies teachers, Flanders (1959) observed that teachers use less than 3 percent of talking time in praise and encouragement and less than 5 percent of talking time in reacting to and using ideas initiated by students. Comparing the incidence of acts of communication, he found that 85 to 95 percent were devoted to intellectual aspects and only 5 to 15 percent to social-emotional aspects of the classroom experience.

The value of feeding back significant information about pupils to teachers was pointed to by Spivak (1957). Teachers of grade 7 were informed about the kinds of problems checked by their pupils on the *Science Research Associates Youth Inventory*. When retested, a control group showed no significant reduction in problems, whereas the experimental group did. Although the number of subjects was small and the experimental manipulation minimal, the work points toward a promising area of investigation.

In studies of the relationship between a teacher's training and his understanding of pupils and their adjustment, Perkins (1958a, b) found, in comparing teachers who did and did not participate in a child-study program, that teachers who did participate had more insight into their pupils' personalities and were more likely to change in the direction of participate. The question of whether the obtained differences are attributable to the effects of the course or self-selection of those who did and did not enroll for the course remains unanswered.

Classroom Culture

Increasing attention was given to aspects of classroom culture as it affects the behavior, attitudes, and learning motivation of children. The growing awareness of the importance of social factors in learning groups prompted the National Society for the Study of Education to devote its current yearbook (1960) to a consideration of sociopsychological aspects of group life in the educational setting.

Studies of classroom culture focused principally on the concomitant effects of the social-relationship structure measured with sociometric devices. Several studies presented evidence regarding the stability of sociometric position in the classroom group. Lippitt and Gold (1959) found high consensus about position in the social structure and high stability of the structure during the school year in a population of elementary classrooms. At the high-school level, Wertheimer (1957) observed sociometric position to be constant from year to year. In a sample of 100 high-school pupils, Cannon (1958) saw high stability of peer-acceptance patterns over periods of one, two, and three years. By means of the four criteria—working together on a committee, going to a picnic, voting for

a school representative, and choosing a best friend—correlations from 0.61 to 0.91 were obtained.

Factors which influence sociometric choices were examined. Scandrette (1958) found that 45 percent of persons desired as friends were chosen from close acquaintances, but 15 percent were chosen from persons known only by sight. Examining the components of power in a sample of 152 children in kindergarten through grade 6, Gold (1958) found social-emotional characteristics to be valued most highly. These highly valued characteristics were attributed significantly more often to children high in the power structure of the classroom. In a study of 418 pupils in grades 2 and 5, using data from teachers' ratings, pupils' ratings, and observations of behavior, Zander and Van Egmond (1958) found that intelligence by itself was not an important determinant of interpersonal relations. For boys, position in the power structure of the group determined behavior more than level of intelligence, whereas differences in either power or intelligence had little effect on classroom behavior of girls.

Brandt (1958) studied the accuracy of reality of self-estimates in a sample of students in grades 6 and 11. A comparison of self-ratings of abilities and social reputations with performance on academic tasks, physical tasks, and classmates' sociometric nominations revealed the accuracy of self-estimates to be positively related to intelligence, ability to predict social position of others, and degree of acceptance by peers. Although the tendency to overrate more than to underrate was common to both sexes, it was significantly more pronounced among boys.

The performance characteristics of children with differential social-relationship positions have been compared along a number of dimensions. Mounting evidence that social popularity is related to intelligence has been supplemented by Gallagher's findings (1958). Davis (1957) reported that highly chosen boys at the seventh-grade level were more intelligent, better able to read, better adjusted, and more favorably disposed toward school than least-chosen boys. Also comparing highly chosen eighth-grade children with least-chosen, Elkins (1958) found highly chosen children to be superior in intelligence and achievement, flexible in role performance, and possessed of attributes which the group valued. In a sample of 640 children in grades 2 and 5, Van Egmond (1960) found the level of utilization of intellectual ability in academic performance related to influence and acceptance by peers. The findings also indicated that disturbance in achievement is greatest for boys when they lack influence in the group but greatest for girls when emotional acceptance is lacking.

Comparing the language behavior of 20 highly chosen with that of 20 least chosen from a sample of 358 children in grade 2, Rosenthal (1957) reported that the percentage of meaningful communication and longer units of communication was higher for children of high sociometric status than for children of low sociometric status. In a sample of 38 preschool children, Marshall and McCandless (1957) found that dependence on adults accompanied relatively low social status and participa-

tion. On the basis of interviews with parents and children, Elkins (1958) found that satisfactory family relationships in which children developed a sense of belonging was conducive to peer acceptance.

Mass Media of Communication

Albert (1957), by means of a picture test, identified high-aggression, medium-aggression, and low-aggression subjects in a sample of 220 children aged 8 to 10. After they had been exposed to various types of cowboy films, aggressive tendencies were measured and a decrease in aggression was found. Changes in aggression were related to the kind of ending the film had and the age and intelligence of the subjects.

A number of issues related to the use of comic books were examined by Carr (1958). An evaluation of various types of comic books was presented, and suggestions for constructive use of these materials was provided. Questionnaire responses from 1190 15-year-old high-school students were obtained by Rose (1958) to measure the effect of mental-health propaganda in comic-strip form. By means of a pre-measure and a post-measure, propaganda messages in the comic strip "Rex Morgan, M.D." were found to influence a small but significant number of readers in the direction of more favorable attitudes toward mental-health problems.

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CHAPTER VII

Educational and Social Policy

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IN A CONTEXT of profound social crisis and change, at home and abroad, it is not surprising that the policy issues with which this chapter is concerned have stimulated debate as well as historical and empirical research. Preference has been given to significant research where it is pertinent, but in a review devoted to policy questions, reasoned argument cannot be ignored. Indeed, in the case of church-school relationships, there has been a notable lack of research, aside from a few historical and legal studies.

The chapter has been organized into four major policy areas: (a) church-school relationships, (b) education for moral and spiritual values, (c) school desegregation, and (d) education in a world society.

Church-School Relationships

At the end of the nineteenth century most informed educators would have said that the major questions of church-school relationships were settled. But there is no doubt that they have now been reopened. Many of the forces at work are not new. The religious pluralism of the American people, the democratic and constitutional doctrine of religious freedom, the belief that education must be based on some moral and social philosophy—these forces were as evident in 1900 as they are today. But they have been augmented by other factors which, if not wholly new, have made their weight felt in recent years. The increased proportion of Roman Catholics in the total population, the rising cost of education, the insistent pressure for federal aid to education, the spectacular rise of neo-orthodoxy among Protestants, the widespread uneasiness about the moral foundations of American society, and the growing anxiety engendered by the world crisis all have contributed to the revival of the state-church-school problem.

Basically, two questions are involved. What place, if any, has religion in the public schools? And what position should the American people take toward parochial schools? In the literature since 1956 both these questions have been discussed in legal, philosophical, cultural, and practical terms.

The Constitutional Question

Sutherland (1958), on the basis of a review of both state and federal cases, argued that there is considerable uncertainty about the right of the public school to teach religion, since the standards of constitutional

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tolerance vary with different stages of maturity of the students and for different emphases in instruction. This legal imperfection, he continued, may be good since, within limits, it allows local decisions—limits which, in practice, are further extended by the difficulties inherent in prolonged litigation.

There would seem to be even more uncertainty in the realm of legal theory. Pfeffer (1958) advanced an extended, carefully documented argument to support the thesis that the rule laid down by the Supreme Court in the *Everson* case (to the effect that state governments may not grant material aid to church schools) is the interpretation of the First and Fourteenth Amendments most consistent with the intent of the framers of the Constitution and the historical development of American democracy. On this ground he defended strict separation of church and state in the interest of religion, of democratic government, and of the people. In contrast, an equally noted legal scholar, Katz (1958), asserted that in debatable cases the significant criterion was not separation but religious freedom. In this view the government must maintain full neutrality, not only between religious groups but also between believers and nonbelievers. But, Katz continued, the principle of freedom would not be contravened by nondiscriminatory aid open to all alike. This rule, he held, should be applied both to released time and to educational payments.

Duggan (1958) went much further, contending that the "no establishment" clause, without any convincing warrant, has been extended so far that it actually limits the "free exercise" clause. Separation of church and state should, he maintained, be interpreted in terms of "cooperation without union," as was historically the case prior to the "devitalization" of American education by the "social cancer of secularism." Howe (1958) insisted that a distinction should be made between federal and state governments. The federal government, he contended, is barred by the First Amendment from any action which would aid any or all religions. But, he urged, when the limitations of the Fourteenth Amendment were imposed on the states, the latter lost only the right to give any aid to education which would significantly affect the liberties of individuals.

Clearly these contradictions in legal philosophy, coupled with the differences in language between the opinions in the *McCollum* and the *Zorack* cases, indicate that the question of church-school relationships has not been definitively or finally answered in legal terms. Johnson (1959) believed it could not be settled in these terms, since the meaning of the church-state problem, as he saw it, is cultural rather than judicial. In a pluralistic culture, he pointed out, certain tensions are inevitable. Johnson regarded such tension as due to the fact that in a pluralistic culture religion cannot be put into any common mold, though the culture also insists that religion is a basic concern. On these grounds he concluded that American society must learn to live with the problem—at best, to achieve "a steadily improving *modus vivendi*."

Additional Reference: Mitchell (1959).

The Teaching of Religion in the Public Schools

The debate about the role of religion in the public schools encompassed the general atmosphere of the school and the presence of religious observances there, as well as direct classroom teaching. Theoretically, there appear to be two points of view: (a) that the public schools, while avoiding sectarian teaching, should have a prreligious orientation and (b) that the public schools should be neutral with respect to religion.

The arguments for a prreligious orientation included three major points: (a) Americans are religious people whose institutions presuppose a Supreme Being. (b) The wall of separation between church and state must not become a wall of separation between school and community or school and parents. (c) The so-called neutral school is in fact a school based on a secular philosophy. Donahue (1958) presented all three of these arguments, whereas Herberg (1958) relied primarily on the doctrine that Americans are a religious people. In opposition, Braiterman (1958) contended both that the teaching of religion was properly the task of the religious community and that the principle of separation of church and state must be rigorously applied to the public schools in order to protect the rights of minority groups. Butts (1957) asserted that it is an unwarranted leap in logic and in history to argue that, because Americans are a religious people, their government rests on religion.

In the area of practical programs there were a number of proposals. Braiterman opposed any form of religious observance or teaching in the public schools. N. C. Brown (1958), Johnson (1959), and Gordis (1959) advocated objective teaching about religion on the ground that religion is an important aspect of our culture. Gordis warned, however, that even objective teaching would not be appropriate in the elementary schools since elementary-school children are too immature to react critically. Both Herberg and Donahue urged a more positive approach, Donahue through co-operation with the various religious faiths and Herberg through creating a genuinely religious atmosphere in the school. Herberg added that the major obstacle to his program is not the Constitution, but the hostility and suspicion among different religious groups.

Again it is apparent that, apart from agreement on prohibition of teaching a particular sectarian doctrine, there is no consensus in theory or in practice about the place of religion in the public schools. What is clear is that there is a considerable, and perhaps growing, body of opinion in Catholic, Protestant, and even Jewish circles that the public schools must recognize the importance of religion in the American way of life.

Additional References: American Association of Colleges for Teacher Education (1958); Dunn (1958); Punke (1957); Walter (1958).

Parochial Schools

The discussion of parochial schools focused on two points—the right to maintain parochial schools and the question of state aid to religious

schools. Two Catholic scholars, McCluskey (1959) and R. E. Wise (1958), justified Catholic parochial schools on the ground that the Church is essentially a teaching organization. A more general defense of the right to establish parochial schools was based on the argument that in education the rights of parents are superior to the rights of the state. Rooney (1958), in asserting the prior right of parents to control the education of their children, pointed out that the state has the right to require both a minimum standard of culture and adequate instruction for civic responsibility, but beyond that the function of government is limited to aiding parents. Substantially similar views were expressed by Gorman (1959), McCluskey, Herberg, and R. E. Wise.

Childs (1957), with specific reference to the Oregon case, charged that the issue had been misstated. He contended that it is not a question of parents versus the public school but rather of the role of the church school. He admitted that the principle of liberty, as the court asserted, may deny the state the right to insist that all children attend the public schools. But, he continued, the same principle may equally preclude the power of the Church to indoctrinate and segregate children by requiring that they attend the parochial school. Unless the educational practices of the Church, he concluded, are examined and altered, the future of the parochial school is not bright.

On the question of financial aid to parochial schools, Gorman held that the state should provide such support on the ground that it is required by the canon of distributive justice and that the failure to grant financial aid violates the prior rights of parents and places a price tag on religious liberty. The principle of distributive justice as applied to education, he contended, means that, if the government passes a compulsory education law, it should equalize the capacity of parents to obey it. R. E. Wise argued that the parochial school is a public school because it performs a public service. Herberg took the same position as Gorman in principle but added that, in view of American historical traditions, it would not be wise to press the claim. McCluskey agreed with Herberg that the Church could not obtain and should not request direct state support for parochial schools. In addition to constitutional barriers, he foresaw that direct government support would result in a serious loss of independence for church schools and believed that the effort to obtain it would arouse so much rancor and strife that community relationships would be poisoned for many years. He did, however, advocate indirect assistance, supporting his argument for it on the theory of child welfare.

Lekachman (1959), on the other hand, asserted that the public school is too valuable to allow encouragement of alternative schools. The public school, he argued, makes democracy workable, since it encourages social tolerance, class fluidity, and openness of mind. Gordis (1959), Nichols (1958), and in some respects Whittemore (1960) agreed with this appraisal of the importance of public schools to a democratic society. Whittemore, however, on the ground that the public school cannot assume

responsibility for educating children in morality or the deeper meaning of life, advocated release of one full day a week to the Church for a comprehensive program of religious education comprising literature, philosophy, and the great religious classics. He argued that the school could give up this amount of time if it concentrated on the essentials of education.

Both Gordis and Nichols challenged the claim that parochial schools are in fact public schools. Nichols argued that public review and supervision are indispensable to public education, and the church school is relieved of such scrutiny. Gordis insisted that only institutions subject to governmental control are public institutions entitled to maintenance from public funds. He also denied that in education the state is merely the agent of the parent, because the school is concerned with transmission of the values which society regards as essential for its survival and unity.

Additional Reference: Ellis (1957).

Education for Moral and Spiritual Values

The pertinent and significant work in this area since 1956 has taken the form of either empirical studies of student values and of the impact of the school on those values or discussions of the philosophical basis (or lack of basis) for moral and spiritual instruction in the public schools. In addition, there have been at least two serious attempts at a logical analysis of the factors involved in moral education. On one fundamental policy issue there appears to be virtual unanimity among the writers examined. Throughout all their work runs, implicitly or explicitly, the assumption that education *should* influence significantly the values of students.

Bibliography

Sibley (1959) surveyed research completed, planned, and in progress in religious and character education. His survey included 131 reports on research and 250 references to abstracts of doctoral dissertations which have been published in *Religious Education*.

Student Values

Several studies of the values held by college students and the influence of college on those values were reported. Jacob's (1957) survey of previous investigations was widely discussed and sharply criticized. These studies and critical appraisals of them were discussed in several chapters of the October 1960 issue of the *REVIEW OF EDUCATIONAL RESEARCH*, but especially in Bloom and Webster (1960). In addition, Riesman (1959) objected that Jacob accepted too readily a research design which ignored

such factors as the sleeper effect, leakage from the experimental to the control group, and decisive impact on a few students.

The *Harvard Crimson* investigation, reported by Rossman (1960), consisted of a random sample poll of 400 Harvard and Radcliffe undergraduates (of whom 319 responded). The poll indicated that Harvard, as Harvard, had little influence on students' religious beliefs and that the most conspicuous aspect of undergraduates' religion appeared to be an individualism which led them to develop their own ideas. No close relation was found between religious and moral beliefs. The individualistic tendencies—a finding somewhat at variance with some other studies—were attributed to the type of student attracted by Harvard.

With considerable reservation it may be said that the studies under discussion, particularly the Jacob survey and the Cornell study reported by Goldsen and others (1960), show (a) that college students generally reflect the dominant values of American society; (b) that where their values are influenced by college, the influence is due more to group associations and the general atmosphere than to curriculum or instruction; (c) that college students are relatively uninterested in politics and tend, on the whole, to be conservative; (d) that, despite considerable interest in religion, students' religious beliefs are not notably orthodox and not important to them in making secular decisions; and (e) that student attitudes are generally marked by conformity, contentment, and self-centered confidence.

Other findings, however, modify this rather pessimistic picture. Jacob observed that some colleges did have a notable influence on the values of their students. Sanford (1958) pointed out that, although the Vassar study supported Jacob's conclusions on the whole, certain desirable changes in personality during college years could be attributed to the influence of the college. Eddy, Parkhurst, and Yakovakis (1959) identified six factors in college which could affect character development: level of development expected by the faculty, faculty's concept of teaching, organization of the curriculum, degree of student responsibility, opportunity for religious understanding, and the effect of the environment.

When all modifications are taken into account, the results of these studies are not encouraging to educators who believe that the school should significantly influence student values. Yet to say that the college experience has not played a significant role in value formation is not to say that it cannot do so. As Jacob suggested, the next stage in research might well concentrate on identifying the factors responsible for the unusual impact on values occurring in some colleges and on discovering more effective ways of influencing value formulation both by means of the design and conduct of educational programs and by means of the general atmosphere on the campus.

The value systems of elementary-school and secondary-school students and the impact of the school at these levels on the values of students have

been little studied. Getzels (1960), analyzing several unpublished studies, saw two categories of values—sacred and secular. The sacred values—among which he included democracy, individualism, equality, and human perfectibility—have remained unchanged, except in emphasis and interpretation. But, he continued, there have been changes in our dominant secular values in four crucial directions: from the work-success ethic to sociability; from future-time orientation to present-time orientation; from personal independence to group conformity; and from moral commitment to moral relativism.

A related study reported differences in the value systems of public-school, private-school, and religious-school students. Prince (1959) administered a questionnaire of 64 forced-choice items (based on Getzel's four categories of traditional values and four categories of emergent values) to 20 principals, 100 teachers, and 1195 students in 22 high schools. The religious schools scored most traditionally, the private schools most emergently, and the public schools fell between. Prince noted that the selection of the school by the parents may have influenced the result.

Additional References: Castle (1958); Dawson (1957); McCluskey (1958); L. N. Miller (1957); Stephan (1958); Suchman (1958); Toch and Cantril (1957).

Logical Analyses

Smith (1958), in the text of his criticism of the Jacob report, undertook to analyze the meaning of the term *value*. Value, he argued, implies more than an attitude or a preference, since it entails evaluating—a critical response based on a reasoned choice between alternatives. Three distinct elements, he continued, are essential to choice: (a) an awareness and an acknowledgment of the difference between truth and falsity, good and evil; (b) the presence of a standard or criterion; and (c) relevant knowledge of the total situation.

Frankena (1958) also contended that education for moral and spiritual values requires evaluation. But he saw the problem of producing virtue as twofold: it is necessary to develop knowledge of how to act, including both the capacity to revise or abandon learned principles in the light of new knowledge and the ability to judge correctly in the case of a conflict of duties; but it is also necessary to produce a disposition to act in the light of knowledge of how to act. It appears he believed that the latter is, in part, a matter of conditioning through the use of external sanctions. He warned that the educator must be concerned not only with development of "first order" dispositions such as honesty, but also, to an even greater extent, with the cultivation of "second order" dispositions such as integrity, self-control, and the readiness to be governed by objective thinking and fact finding.

Moral and Spiritual Education in the Public Schools

The introduction to this section stated that none of the writers reviewed opposed the assumption that to cultivate moral and spiritual values is a legitimate and necessary function of education. There has been, however, sharp discussion of both the capacity and the right of public schools to provide this essential ingredient of education. The basic issue revolves around the contention, advanced by Smith (1958), that evaluation involves not merely making choices but also the ordering of these choices, and one's whole life, by a pervasive and unifying principle.

Phenix (1958) went still further, contending that *every* education program is based implicitly or explicitly upon some rationale derived from basic convictions about the ends of life. Indeed, he asserted that every living society—and the very ability to operate public enterprises—requires a common faith with respect to certain human relationships. Secular public education does not and cannot operate without a set of first principles embracing particular doctrines about the nature of man, of knowledge, and of the highest good—doctrines which, when religion is functionally defined, constitute a secular religion. Hence, he concluded, the issue is not whether there should be religion or no religion, but simply what religion. In part, Nichols (1958) agreed with Phenix's analysis, maintaining that "good public-school education is theological." He added, however, that his statement did not mean it is necessarily informed by a specific theology.

On the grounds set forth by Phenix, many religious leaders have argued that the public school, far from being neutral with respect to religion, assumes and subtly inculcates the secular philosophy of scientific humanism. Butts (1958), however, asserted that the issue has been misstated. The philosophy of the public school, he argued, should not be based on the image of the sacred man or the image of the secular man, but rather on the concept of the free man. For Butts, this meant that the public school should foster the image of the free man in his intellectual, moral-political, and personal dimensions, without, however, any appeal to religious sanctions or any assertion that a belief in God is necessary for knowledge, citizenship, morality, or personal development. Smith agreed with Butts that the core value is that of the free man and the self-determining personality. He further contended that, to influence the commitment of students, it is necessary to do more than describe and explain the situations in which value issues arise. There is need, he continued, for both a sharper delineation of the values involved and a more pointed discussion of the conflicting standards entailed, together with the various grounds on which these standards are based.

Axtelle (1960) declared that problems of value and moral and social philosophy require the same kind of inquiry as that employed in technical or theoretical problems. He admitted that a theory of value is necessary but contended that such a theory should be derived from the empirical facts of valuing and evaluation.

Naturally, the formulations of Butts, Smith, and Axtelle were not satisfactory to those who hold that the foundations of moral and spiritual values must be discerned in revealed religion. Nor were they satisfactory to those who, like Phenix, contend that the position taken by Butts, Smith, and especially Axtelle is tantamount to an avowal of a secular religion inimical to the religious freedom of those committed to a supernatural religion. In this vein, Whittemore (1960) denied that the public school could assume responsibility for education in morality or the deeper meaning of life. As noted earlier, he maintained that the problem could be solved by the release of one day a week for religious instruction. Nichols thought that the public school could inculcate certain moral traits; but he took exception to efforts by the public school to affirm particular sanction for these values, rather than merely pointing out that sanction is important and indicating alternative points of view.

Phenix took an intermediate position, holding that the public school should not abandon its search for a common faith, nor should it ground its educational program in either a doctrinaire humanism or an orthodox theism. The solution lies, he thought, in the formulation of a more comprehensive faith. But it is difficult to see where his specific formulation of this faith—too detailed for inclusion here—goes beyond the position taken by Smith.

Additional References: California Committee for the Study of Education (1957); Garry, Gawrys, and Phillips (1960); Kilpatrick (1958); Livingstone (1958).

School Desegregation

No issue in American life has aroused more feeling or provided more controversy than desegregation of the public school. Ample evidence of this fact is to be found in previous chapters of the REVIEW by Van Til (1959) and Dodson and Linders (1959), which discussed the writings on desegregation (as does also a section of Chapter III of this issue). Yet, unlike the problems treated in the first two sections of this chapter, the basic policy issue involved has not been subjected to debate. There have been a number of legal analyses, case histories, and empirical studies bearing on the subject, but, in the literature surveyed, only one article that could be classified as fundamental policy argumentation.

Legal Interpretations

Blaustein and Ferguson (1957) analyzed the 1954 decision of the Supreme Court, including precedents and the views of the individual judges. They also examined the implications of the decision, the patterns of implementation, and the patterns of delay or avoidance. Garber (1958) reported on recent decisions of the courts dealing with desegregation, covering a

variety of subjects which affect the operations of schools. Butts (1957) argued that the Constitution should be interpreted by the courts to the effect that the states may not legally abolish their public-school systems and that their right to control public education is limited by a legitimate federal concern for liberty and equality. He also maintained that the issues of state rights, desegregation, federal aid to education, and church-school relationships are closely interconnected and must now be regarded as parts of one problem.

Negro Schools

Harlan's (1958) carefully documented historical study of Negro schools in the southern seaboard states from 1900 to 1915 revealed, along with a marked increase in educational opportunities for white children, a striking decrease in relative opportunities for Negro children. Wilkerson (1960) pointed out that from 1950 to 1954, during the progress of the school desegregation cases through the courts, the ratio of the per capita value of school property for Negro children to the per capita value of school property for white children in Virginia rose from 62.2 percent to 86.2 percent. From the 1954 decision of the Supreme Court to its subsequent implementation decree in 1955, the ratio remained practically constant, but since 1955 it has declined to 78.1 percent in 1957.

Segregation in Northern Cities

Boucher and Brooks's (1960) study of housing patterns in Northern cities indicated that housing discrimination in the North is as real as socioeconomic discrimination in the South. They concluded that, as a result of the segregation of nonwhites in certain residential areas of these cities, many of the schools in these areas will not undergo large-scale racial integration unless, as in New York, deliberate steps are taken to this end.

Patterns of Resistance

In addition to writers previously reviewed by Dodson and Linders (1959), Goodall (1958), from an analysis of the votes of Southern congressmen on 275 roll calls during the 1933, 1937, 1941, and 1945 sessions of Congress, saw an important difference in the voting patterns of congressmen from urban and rural districts, even when those districts contained a large proportion of Negroes. The national Administration, he added, must realize that all Southerners do not think alike, and it should not, therefore, give undue weight to acts of state officials who are largely controlled by voters from rural areas.

Campbell and Pettigrew (1959) undertook to make a detailed study of the behavior of the Little Rock clergy, other than the Roman Catholic,

during the school desegregation crisis in that city. The study was based on direct observation and on interviews with 42 Protestant ministers and Jewish rabbis selected by the snowball technique to locate the most influential sect and church leaders. Campbell and Pettigrew found that, in general, the pastors of the large, upper-status, influential churches favored integration, whereas the pastors of the working-class churches favored segregation, often on the ground that it was the will of God. But they also found that, as the crisis deepened, the segregationist ministers became more active and those who favored integration became progressively more silent. This behavior of the liberal ministers was attributed to lack of mass support, increasing pressure from segregationist forces, and fear of disrupting the unity of their churches.

Martin (1957) described the development and tactics of the White Citizens' Councils and the activities of the NAACP in relation to the councils. He also examined school problems growing out of desegregation and quoted the views of a number of administrators and teachers in schools where desegregation had taken place. Increased activity by the councils, Martin reported, has been accompanied by an increase in anti-Semitism and by trouble in the labor movement.

These studies of Southern resistance to desegregation have for the most part dealt with different communities and with different aspects of the problem; but, with the possible exception of Martin's, they support Goodall's observation that even the deep South exhibits significant differences of opinion on the question of integration. They strongly suggest that, if it were not for the political, economic, and social pressures instigated by rabid segregationist elements, these differences of opinion would play a larger part in public action.

Additional References: Brown (1958); Dwyer (1957); Guzman and Hall (1958); Kettig (1957); A. S. Miller (1957); Peters (1959); Reed (1957); Rich (1960); Rosenthal (1957); Southern Education Reporting Service (1959); Tumin (1958a, b); Vander Zanden (1958); Williams (1957).

Acceptance of Negroes in Desegregated Schools

Dwyer (1958), on the basis of direct observation, questionnaires, and interviews with administrators, teachers, and students in seven central Missouri school districts, undertook to study the patterns of white-Negro interaction in recently desegregated schools. He found that these patterns were significantly affected by age and grade level, sex, and the length of time the school had been desegregated. There was a greater degree of informal interaction among boys and younger children and in schools with a longer period of desegregation. There was little carry-over from one interactional situation to another.

Spruill (1960), seeking to determine the extent to which desegregation has affected the employment status of Negro teachers, examined the litera-

ture on desegregation and case studies of 28 teachers. In addition, he questioned 280 teachers, of whom half responded. His findings indicated that, although Negro teachers have lost considerable ground in terms of employment, most have been retained in their fields of academic preparation. Negro teachers are being hired in secondary schools as well as elementary schools, and a few Negroes have been retained as principals and supervisors.

Additional Reference: Moss (1957).

Education in a World Society

Writings in this area are extensive. Some were surveyed in this REVIEW by Van Til (1959). For the most part they are nonresearch articles dealing with methods and materials. Some material more or less pertinent to the objectives of this chapter was uncovered.

Bibliographies

Flack (1958), Heath (1958), and the U.S. Department of Health, Education, and Welfare (1959) published extensive and excellent bibliographies of books and articles dealing with almost all aspects of education for international understanding. The Heath bibliography and Department of Health, Education, and Welfare bibliography also contain references to material in the field of comparative education. Randall (1959) compiled a limited but still useful bibliography of resources for study of international education.

Theoretical Analysis of the Goal

Cajoleas (1960) attempted a logical analysis of the meaning of the terms *international* and *understanding* as they are used in the context of education. He argued that both terms should be viewed from three different perspectives; however, the perspectives proposed for *international* are not the same as those proposed for *understanding*. He asserted that education for world understanding must be guided by a carefully formulated philosophy based on a moral commitment to humanity as a whole.

Improving Instruction

Hamilton (1960) surveyed in detail a number of studies designed to improve instruction dealing with international relations and world understanding. She believed (a) that the schools must reorient instruction about world relationships to include areas outside Europe, (b) that instruction must be directed toward the development of maturing young people who

are secure enough to be flexible while able to think critically, and (c) that *isms* must be explained in operational terms. Van Dyck (1959) reported on the project Improving the Teaching of World Affairs in New York State, which was also discussed by Hamilton. This project is largely an action-research program in the Glens Falls, New York, schools, checked by a control group. Both Hamilton and Van Dyck described the project, but results were not available when their articles were written.

Additional References: Cormack (1957); Scanlon (1959); Swift (1959); United Nations Educational, Scientific, and Cultural Organization (1959).

School Programs

The National Education Association (1960) conducted a questionnaire study of the activities of elementary schools in fostering international understanding. Respondents were 269 members of the Department of Elementary School Principals. The results showed emphasis on the study of the Western Hemisphere and Europe. Russia received only 3.5 percent of the attention given to foreign areas. Results showed that most effort was given to developing the understanding of other parts of the world in the sixth grade. Nine out of ten principals believed that the study of foreign language contributes to international understanding, and 43.1 percent of the responding schools offered instruction in at least one foreign language, some as early as the first grade.

Weidner and others (1958) prepared an exhaustive inventory of the international programs of American universities. Information was secured by means of a questionnaire addressed to 1945 heads of universities or branches of universities, which brought a 100-percent return. The inventory disclosed that over 7000 persons were engaged abroad in educational programs sponsored by American universities.

The American Council on Education (1957) also employed a questionnaire (to 842 member institutions of the council, with more than a 50-percent response) to study the international-education activities of American universities and colleges. The results, as interpreted by the council, indicate that a greater degree of order is needed in the area of international-educational activities. It was the view of the council that attainment of this end would require: (a) agreement with the federal government that the purpose of such programs is to educate so as to bring about an understanding and exchange of ideas over national boundaries, (b) a greater degree of participation by American universities and colleges in the development of policies and programs for government-financed projects at the university level, and (c) better channels of communication between government and private institutions.

Additional References: Kandel (1957); Quattlebaum (1959); Stone (1958); Wise (1958).

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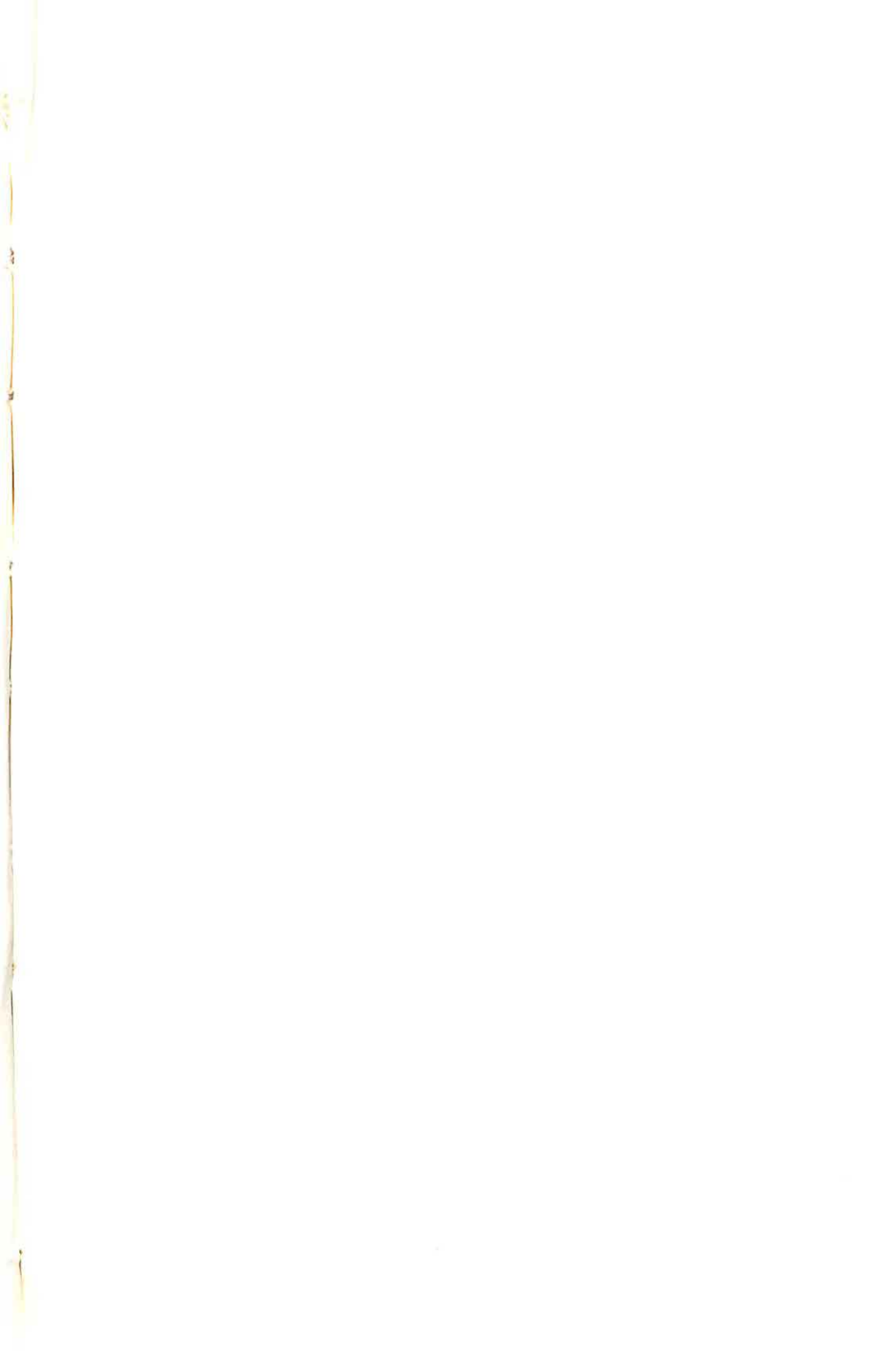
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FOREWORD

This issue of the REVIEW follows the general pattern in the language arts and fine arts cycle by reviewing the research which has appeared since the material covered in the April 1958 issue.

Of the many topics which might deserve attention in this foreword, one seems particularly important. Much of our research in language arts has been conducted by means of short-term, single-variable studies. Research done in this manner provides tantalizing leads to relationships and to instructional procedures, but does not permit us to determine clearly the influence of the development of one language art upon the other. Nor do we know with assurance how instructional procedures in one area of the language arts influence performance in another. Studies which provide information on these problems are difficult to design and carry out, but the importance of their conclusions makes it imperative that such research be done.

The research in language arts during the past three years has moved ahead substantially. Careful design and analysis of experimental studies, plus continued attention to important problems, will bring even greater knowledge.

The chairman expresses his appreciation to members of this committee and to the chapter authors who generously gave time and energy in preparing this issue.

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CHAPTER I

The Psychology of Language

PAUL M. KJELDERGAARD

THE INTERIM since the previous review can be characterized as one of changes for the psychology of language. First, interest in the area has intensified, with a consequent increase in the volume of relevant literature. Second, the structure of the field has shifted somewhat so that certain topics (for example, information theory) which were of prime concern three years ago now play a relatively minor role, whereas other topics (for example, mediated generalization) now command an even larger share of attention.

As a result of the phenomenal growth of the field during the last three years, this review can present only a partial picture of recent developments in the scientific study of language behavior; selection of articles and books to be included has been based on judgment of the importance of the topic and its application to education. Readers may wish to consult the recent review of psycholinguistics by Rubenstein and Aborn (1960).

Theories

Inasmuch as the aim of all science is construction of a systematic framework with which to interrelate and explain observed phenomena, recent developments in theories or models of verbal behavior will be considered first. Most theories of current interest were expounded several years ago and were covered by Carroll in the previous review.

Of the new developments, the electronic computer was seen as the counterpart of the human central nervous system and as such was used to describe language behavior, with emphasis on cognition, by Miller, Galanter, and Pribram (1960). In a similar way, Carroll (1959) used the computer program as a model for describing the acquisition of language. Carroll accepted Skinner's descriptive analysis of language and then related how the environment (for example, parents) and internal elements (for example, the nervous system) determine what verbal responses a child acquires and under what circumstances these responses will be produced—in much the same manner as a computer program dictates what operations the machine will perform with various kinds of input. Brown and Dulaney (1958) proposed a language model similar to Skinner's, incorporating a theory of a meaning as developed by Osgood. The Brown and Dulaney model offers nothing new but is a readable account of language acceptable to many psychologists.

Most of the earlier psychological theories of language focused on the problem of mediated generalization. Mediated generalization is what takes

place when learning in one situation has a facilitation effect on the learning in a second situation, even though there is no direct connection between the elements of the two learning experiences. Such transfer effects are presumably due to a connection between the stimulus elements established via a common response in some prior learning; the common response (or its stimulus properties) is said to mediate the new learning. Schematically, there are:

Prior Learning:

Stimulus A \longrightarrow Response C \longrightarrow (Stimulus consequences of C)
 Stimulus B \longrightarrow Response C \longrightarrow (Stimulus consequences of C)

New Learning:

Stimulus A \longrightarrow (Implicit C) \longrightarrow (Stimulus conseq. of C) \longrightarrow
 Response D
 Stimulus B \longrightarrow (Implicit C) \longrightarrow (Stimulus conseq. of C) \longrightarrow
 Response D

The connection between stimulus B and response D is accomplished, in part, during the A to D learning when the implicit response, C, and its stimulus consequences are connected to responses D.

Mediation theorists can be divided into two groups on the basis of their conceptualization of the mediational mechanism. One group, those postulating representational mediators, place emphasis on the nature of the mediator and describe it as one or more fractional components of the previously learned response together with its neural consequences. The second group, the associative theorists, emphasize the effects of the mediation process and vaguely describe the mediator as if it were simply an implicit response not unlike overt verbalization. The works of Osgood and his associates (see Osgood, Suci, and Tannenbaum, 1957) and Mowrer (1960) are illustrative of the theorists invoking representational mediators. Jenkins, Mink, and Russell (1958) and Bousfield (1959) are among the exponents of associative mediation.

A large body of empirical evidence supports the idea of mediated generalization. Historically, experimentation concerning this problem dates back to the beginning of this century, and modern experimental studies were performed in the early 1930's. The current studies fall into two classes, those utilizing the classical Pavlovian conditioning paradigm and those employing multistage paired-associate learning paradigms. A classical conditioning study by Phillips (1958) demonstrated that the galvanic skin response (GSR) conditioned by pairing a word, the conditioned stimulus (CS), with a loud tone, the unconditioned stimulus (UCS), would generalize to other words related to the CS by prior learning. The previous learning had consisted of relating Turkish words to shades of gray. The magnitude of the generalization effect was an inverse function of the distance between the gray associated with the test word and the gray associated with the CS.

Grice and Davis (1958) conditioned an eyeblink, the unconditioned response (UR), to a tone, CS, using a puff of air, UCS, to elicit the blink. Subjects also made a specific motor response to the CS. Two other tones were paired with motor responses, one response being the same as that made to the CS, the other different. In the test stage, the unconditioned tone which had a motor response in common with the CS produced more eyeblinks than the tone which had been paired with the different motor response. Branca (1957) reported negative findings in an experiment involving electric shock as the UCS, GSR as the UR, and words or pictures as CS's. Only when subjects recognized the relationship between the training stimuli and the test stimuli, and expected shock, was there an increase in GSR. Historically, electric shock has often produced results that are not found with other types of stimuli. In view of the preponderance of positive evidence, these results must be considered an artifact of the experimental situation.

Where paired-associate learning is considered, three basic types of three-stage paradigms may be depicted as follows:

	I	II	III
Stage 1:	$A \longrightarrow B$	$A \longrightarrow B$	$B \longrightarrow A$
Stage 2:	$B \longrightarrow C$	$C \longrightarrow B$	$B \longrightarrow C$
Test Stage:	$A \longrightarrow C$	$A \longrightarrow C$	$A \longrightarrow C$

Type-I paradigms are referred to as response-chaining paradigms; that is, the response of the first stage becomes the stimulus of the second stage, presumably establishing an $A \longrightarrow B \longrightarrow C$ chain. Paradigms of Type II are termed acquired-stimulus equivalence; that is, the stimuli are equated experimentally by pairing them with the same response. Analogously, the Type-III paradigms are called acquired-response equivalence. By interchanging the first two stages of Type-II and Type-III paradigms, four equivalence paradigms are generated. This manipulation, together with inversions of stimulus and response terms, yields four chaining paradigms.

An investigation of all eight paradigms, along with a theoretical analysis of possible mediational mechanisms, was the subject of a monograph by Kjeldergaard and Horton (1960). Seven of the eight paradigms produced significant generalization effects. Cramer and Cofer (1960), using different experimental materials, tested the same paradigms and obtained positive effects in each case. Both sets of authors emphasized the necessity of postulating backward associations (that is, learning $A \longrightarrow B$ simultaneously establishes a $B \longrightarrow A$ connection) in accounting for their results. Norcross and Spiker (1958) obtained positive results with a Type-I paradigm with very young children as subjects. Jeffrey (1957) tested the same paradigm, as well as one of the Type-III paradigms, in each case using a motor response as the C term. Both paradigms produced facilitation in the test stage. Kaplan (1959) reported significant mediational effect with a Type-II paradigm.

Additional References: Cofer (1958); Osgood (1957); Quine (1960).

Research Techniques

A tabulation of responses given in word-association tests, particularly the Kent-Rosanoff list, has been widely used by the association theorists as providing indicators of verbal-habit strength. Habit strength is judged from the normative data in two ways: the more frequently a word is given in response to a particular stimulus word, the stronger the assumed associative bond between the two words (Jenkins, 1959; Deese, 1959); or, the greater the percentage of overlap in the responses to two stimulus words, the stronger the connection between stimuli (Bousfield, Whitmarsh, and Danick, 1958). These measures predict reasonably well such things as facilitation in paired-associate learning (Storms, 1958; Underwood and Schulz, 1960b) or the extent to which words presented in random order tend to be recalled in clusters (Jenkins, Mink, and Russell, 1958).

Attention recently has centered on what variables affect the responses given in word-association tests. Cultural changes, for example, have produced differences in norms collected at various time periods (Jenkins and Russell, 1960). Popular responses are the most stable and have increased in frequency over the years, whereas superordinate responses (for example, chair—furniture) have tended to disappear. Brown and Berko (1960), in a study marred by faulty statistics, found systematic changes in the tendency to give responses that belong to the same form class as the stimulus (for example, adjective to adjective) with increases in age. Cofer and Ford (1957), prior-association tasks (Maltzman and Simon, 1959), instructions (Maltzman, Bogartz, and Breger, 1958), and judged similarity between stimuli (Cofer, 1957) also affect the type of response in association tasks.

The semantic differential is an adjectival rating scale where subjects rate concepts in terms of closeness to the extremes of bipolar scales (for example, good—bad). Originally developed in connection with Osgood's mediation theory, this instrument has since become a general research tool, widely used and often found very sensitive. Carroll (1960) used the semantic differential, together with other measures, to factor-analyze the styles of a diverse selection of literary passages. Six factors emerged, several of which were defined by semantic-differential scales: general evaluation, personalness, ornamentation, abstractness, seriousness, and narration.

Yavuz and Bousfield (1959) demonstrated that subjects retained the connotative meanings of Turkish words, as measured by the good—bad continuum of the semantic differential, even though they had forgotten the English "translation" learned earlier. Staats, Staats, and Heard (1959) showed in a similar study that the connotative meanings of English words may be changed by paired-associate learning. McMurray (1958) showed that semantic differential ratings of abstract symbols and words were related to judgments by another group of subjects as to which pairs of symbols "best fit" the words.

Measures of associative clustering have also been extended beyond their original area of application so that they are now used on a variety of materials to demonstrate relationships between items. The technique was created by Bousfield and his associates, who have demonstrated that when a list composed of words from several taxonomic categories (for example, professions, animals, and vegetables) is read to a group of subjects in random order, recall by the subjects is not random but organized according to category (Bousfield, Cohen, and Whitmarsh, 1958; Brand and Woods, 1958). Other word relations such as synonymity (Cofer, 1959) or association strength (Jenkins, Mink, and Russell, 1958), as judged from word-association norms, have also been shown to produce clustering.

Bousfield, Berkowitz, and Whitmarsh (1959) reported an interesting study in which subjects were presented with four groups of minimally meaningful designs and asked to reproduce them after each exposure of the series. Successive trials were accompanied by increases in the amount of clustering. Intrusions during the early trials, that is, designs recalled by the subjects which had not been included in the series, tended to belong in one of the categories. Thus, when subjects are given a set of materials to learn, they tend to organize them on some basis, and this organization process may even precede the learning.

Additional References: Jenkins (1960); Jenkins, Russell, and Suci (1958).

Verbal Learning

The related variables, meaningfulness (as measured by the percentage of subjects who report an association to a stimulus or by the mean number of discrete associations given by subjects in a specified period of time) and frequency, have received considerable attention in the last few years. It has been repeatedly shown that meaningfulness affects the rate of paired-associate learning and that the meaningfulness of the response term is more important than the meaningfulness of the stimulus term (Mandler and Campbell, 1957; Cieutat, Stockwell, and Noble, 1958; Jantz and Underwood, 1958; Hunt, 1959). In serial learning, meaningfulness interacts with intertrial interval; the less meaningful the material, the more important it is that practice be distributed (Braun and Heymann, 1958; Underwood and Richardson, 1958; Ellis, 1960). Stimulus position (Vinacke and Smith, 1959) and motivating instructions (Sarason, 1957) also interact with meaningfulness in serial learning.

Frequency of prior exposure to experimental materials, whether controlled experimentally or judged on the basis of word or letter counts of literature, is also related to learning difficulty. Epstein, Rock, and Zuckerman (1960) showed that familiarization facilitates paired-associate learning. Runquist and Freeman (1960) found that discrimination learning (selecting a "correct" word from a series of pairs) is faster after familiarization if the pairs are heterogeneous in meaningfulness, but not if they are homogeneous.

Underwood and Schulz (1960a) skillfully summarized and interrelated most of the literature on frequency and meaningfulness. They concluded from their own research that frequency will accurately predict the ease or difficulty of learning materials of low meaningfulness, but at higher levels a third variable, pronounceability, becomes the best predictor.

The relationship between word frequency or prior exposure and speed of word recognition whether tested visually (Taylor, 1958) or aurally (Rosenzweig and Postman, 1957) has been established by many researchers as a positive linear function of log frequency and recognition time. Goldiamond and Hawkins (1958) obtained the same kind of relationship between number of pre-experimental exposures and tachistoscopic recognition time when the exposure field was left blank. The authors' conclusion that this casts doubt on the perceptual interpretation of earlier experiments seems premature because of the unusual procedure followed. Subjects were led to believe that it was an experiment in subliminal perception and that the words to be recognized would be the ones they had previously seen. This experiment shows only that exposure frequency affects guessing behavior.

A learning phenomenon with obvious educational implications was discovered by Rock (1957). He found no differences in learning speed between subjects for whom a new pair of words was substituted each time they made a mistake and subjects to whom the identical list was repeated. These findings have since been confirmed by several investigators (Rock and Heimer, 1959; Wogan and Waters, 1959; Clark, Lansford, and Dallenbach, 1960).

Other kinds of experimental evidence also support the notion that at least some learning may take place in a single trial. Bolles (1959) reported that interchanging items in the middle of a partially learned serial list produced no decrement in learning. Even the substitution of new items in the middle of the list had no effect. Investigators studying the effects of fractional occurrence of the response term in paired-associate learning found that decreasing the response term's frequency of appearance increased both errors and number of trials necessary to learn. An item analysis, however, revealed that once an item was correctly anticipated, it was seldom missed in the remaining trials (Goss, Morgan, and Golin, 1959; Schulz and Runquist, 1960). Wallace, Turner, and Perkins (1957) demonstrated that practiced subjects learning meaningful material at an uncontrolled pace could, in a single trial, acquire several hundred pairs of words in paired-associate learning.

Additional References: Allen (1958); Umemoto (1959).

Linguistics and Psychology

In the area of overlap between psychology and linguistics, progress on the mutual problems has been slow, but some of the avenues of approach

appear fruitful. For example, Carroll (1958a) found striking differences in the syntactic structure of sentences produced by subtle modifications in directions. This was true both for the written compositions of subjects describing an event and for the oral productions of subjects playing a highly technical "game." Carroll illustrated the importance of such research by showing that two categories of a widely used projective test can be accurately scored on the basis of grammar. Aborn, Rubenstein, and Sterling (1959) demonstrated that form class, as well as position in sentence and sentence length, was a significant variable in determining how well subjects could supply words deleted from sentences.

Pauses in oral productions were found to be negatively related to the predictability of words in sentences (Goldman-Eisler, 1958). Maclay and Newman (1960) used a two-person communication situation to test the effect of feedback on certain linguistic variables. The subject's task was to communicate a description of a geometric form to a hearer so that he might select the correct one from a number of alternatives. The similarity among the alternatives and the kind of feedback affected the nature of the communication. Homogeneous items and negative feedback increased the amount of verbalization. Heterogeneous items elicited a broader vocabulary. An additional finding was that the number of morphemes, a linguistic measure, and the total response time were nearly perfectly related ($r = +.98$), indicating that the gross measure could substitute for the time-consuming linguistic count.

The linguistic relativity hypothesis, as in the past, generated much philosophical discussion (Henle, 1958; Trager, 1959) but little in the way of empirical evidence. If we accept the distinction set forth by Carroll (1958b), the problem disappears. He distinguished between the "mold theory" as put forth by Sapir and Whorf and the "lattice theory." The former holds that perception is possible only within the molds formed by our language structure. This position is untenable, says Carroll, for it would logically preclude language learning by anyone who did not already have a language with which to encode the basic concepts. The lattice theory, on the other hand, states that our language structure predisposes us toward those discriminations for which we have been reinforced in the past. Given tasks such as sorting, classifying, or problem solving, we tend to rely upon these discriminations even though others are possible.

The proceedings of an interdisciplinary conference made up of representatives from psychology, linguistics, and literary criticism provided the materials for an interesting book on literary style (Sebeok, 1960). Spice was added to the stimulating papers by the inclusion of the post-paper comments by the participants. The general picture painted by the book reminds one of the parable about the blind man describing the elephant: the various disciplines seem to be attacking different parts of the anatomy, perhaps even different animals.

Brown (1958) wrote a very readable account of many aspects of language learning in a book whose theme is that language learning consists

of the development and modification of sets of categories. The book covers such topics as meaning, primitive language, reading, linguistic relativity, and phonetic symbolism.

Additional References: Attneave (1959); Henle (1958); Hockett (1958); Wallach (1958).

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CHAPTER II

Reading

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AN ANALYSIS of the research publications in reading for 1957 through 1960 reveals no new areas or techniques of research, although certain topics—such as methods of teaching—are claiming greater attention than before. For the purpose of organizing this report, the following topics have been used: general bibliographies and reviews, grouping practices, methods, materials, comprehension, factors related to reading, visual problems and reading, and remedial reading. Under each of these headings only representative studies are discussed.

General Bibliographies and Reviews

The article on reading in the *Encyclopedia of Educational Research* provides a comprehensive coverage of the research as interpreted by Gray (1960a). Divided into three main topics—sociology, physiology and psychology, and teaching of reading—this review with a selective bibliography of 412 items should be “required reading” for anyone desiring an understanding of the research background in the field.

Three annual reviews of research were prepared by Gray (1958, 1959, 1960b), continuing a series unbroken since 1925. Traxler and Jungeblut (1960) published a bulletin giving a descriptive review of research with a selective annotated bibliography of 438 items covering the period July 1, 1953, through December 31, 1957. Selected studies for the period 1955 through 1957 were reviewed by McCullough (1958).

Practical reviews of what research reveals about high-school reading were made by Gunn (1957a), Early (1957a), McCullough (1957), and DeBoer (1958). These reviews were published also in pamphlet form (Gunn, 1957b). Traxler (1957), Early (1957b), and Jewett (1957) presented reviews of research on reading in the junior high school. Bliesmer (1958, 1959) summarized the research related to college and adult reading.

Grouping Practices

In the elementary school the Joplin Plan, where reading instruction is departmentalized on ability levels, was the subject of several reports. Aaron, Goodwin, and Kent (1959) used this procedure in three fourth-

• Professor Robinson prepared the section on visual problems and reading and the section on remedial reading.

grade classrooms where each teacher taught two levels of reading ability. Although the instructional period was six months and the average gain in reading skill as measured by the *California Reading Test* was ten months, no control group was used; so conclusions cannot be drawn.

A somewhat similar study involving a total of 90 matched pairs of fifth-grade and sixth-grade children was carried out by Morgan and Stucker (1960). A year's instructional program was carried out by eight teachers who had volunteered for the study and were then randomly assigned to the experimental or control group. The results tended to favor the experimental (Joplin Plan) groups, especially at the fifth-grade level. In some comparisons, the practical significance of the difference was questionable. No provision was made to measure pupil growth in related language arts areas.

Bremer (1958) investigated the effect of assigning to a separate classroom those first-grade children who made low scores on the *Metropolitan Readiness Test*. Pupils were matched on a variety of factors (including sex, chronological age, readiness score, and teacher) with first-grade students of the next year's class. Differences in reading scores at the end of the first year were slight, but the high-readiness pupils made greater progress (0.05 level of confidence) in the more heterogeneous classroom.

Additional Reference: Hart (1959).

Methods

Research on the relationship of phonics instruction to reading ability was presented in a concise, readable account by Smith (1957). New research in this area has centered on the questions of how phonics should be taught, when it should be introduced, and to what extent it should be emphasized—not whether it should or should not be used.

A questionnaire survey by Purcell (1958) indicated that nearly all of the sampled teachers introduced children to analytical examination of words. Only 6 percent of the teachers relied on "incidental drill" in sounding or phonic instruction. A synthetic phonic method (word parts to whole words) was compared to an analytic word method (whole words to word parts) by Bear (1959), using seven control and seven experimental first-grade classrooms. Both groups used a basal reader. The control groups utilized workbooks and manuals, and the experimental classrooms presumably eliminated from the basic program "all phonic material" and added instruction from a synthetic-word-method textbook. Results favored the synthetic method. Two factors deserve special attention in evaluating the study: the experimental teachers volunteered, but the control teachers were selected. Also the experimental group probably used a combination of analytical and synthetic techniques.

Aaron (1960), using eight phonic generalizations presented by Betts, prepared a test of nonsense words to learn how well teachers and prospec-

tive teachers knew and could apply phonic rules. Although the results were disappointing, it may be that the *rules* and not the teachers were at fault—for some of the rules appear to have as many exceptions as applications. Aaron's work is an exploratory study in an area which deserves much more attention.

In a report of a series of studies, Durrell (1958) challenged some traditional aspects of the first-grade reading program. With a variety of approaches—including early instruction in names and sounds of letters, omission of readiness instruction for bright children, and careful supervision—good reading growth was attained by his experimental groups. From the nature of the design, it is difficult to assign Durrell's results to a particular variable. More research is needed on these aspects of the first-grade program. Robinson (1959) presented an analysis of Durrell's procedures and conclusions.

The most intriguing problem of method in the period under review is the revival of the philosophy of a child-centered reading curriculum, now implemented through programs described as *individualized* or *self-selection* reading. Smith (1960) believed these methods have promise in serving "as one part but not constituting all of the instructional program." Witty (1959), in a balanced and thoughtful article, reviewed and evaluated the philosophy and some of the pertinent research on individualized reading.

Though the literature is replete with testimonials by teachers (for example, McVey, 1960) who wish to "stand and be counted" for individualized reading, the published research on the value of the method is meager and often so unsophisticated as to be almost meaningless. Illustrations of such research are provided by Sharpe (1958) and Kingsley (1958). Sartain's (1960) work is the most careful and extensive reported to date. Using a rotation plan where each teacher in the experiment used individualized reading for part of the year and a basic reader for another part, Sartain compared growth of second-grade children under both approaches. He found that whichever method was used, children achieved greater growth during the first part of the year. This was an important finding, for, without a balanced rotation, whichever method had been used first would have appeared to be the better.

Test results revealed that basic instruction was superior (0.05 level of confidence) for the "low-reading" group in developing reading vocabulary. Other differences were not significant. Teacher reaction was assessed for advantages and disadvantages of the individualized method. On the basis of his experimentation, Sartain recommended a judicious combination of both methods. Gates (1958) took a similar stand: "We should nip in the bud the idea, now beginning to emerge, that one must accept one or another of two antagonistic systems. We must undertake to discern the good features of each and attempt to embody them into what should be a better system than either."

There is no conclusive evidence at present to support abandonment of basic programs in favor of a completely individualized approach.

Additional References: Bloomer (1960); Bohnhorst and Sellars (1959); Durrell (1959); Kelly (1958); Luser, Stanton, and Doyle (1958); McCullough (1957a); Muehl (1960); Veatch (1960).

Materials

No major studies of the evaluation of materials or their usefulness appeared during the last three years. Tinker (1960), continuing his careful investigations of typography, provided some data on the construction of mathematical tables: (a) for maximum efficiency in locating information, the numerals should be grouped in columns by fives or tens; (b) a rule in addition to a one-pica space between columns apparently makes little difference in speed of location of information.

Blakely (1958a, b) investigated the type (quality) and extent of comic-book reading by seventh-grade boys and girls. He found (a) that there was less reading of comics than some earlier investigators had found; (b) that few poor quality comics were being read; and (c) that boys who read the most comics also read the most library books. His studies contained no evidence to support forced curtailment of comic-book reading.

Powers, Sumner, and Kearl (1958) provided a "recalculation" of the Flesch, Dale-Chall, Gunning, and Farr-Jenkins-Paterson formulas by using the 1950 revision of the *McCall-Crabbs Graded Test Lessons in Reading*. In view of the research available on the original formulas, the new regression equations developed by Powers, Sumner, and Kearl should probably not be used when comparisons with earlier studies are to be made. The computing diagrams provided by Powers and Ross (1959), since they are based on Powers's "revised" formulas, are subject to the same limitations.

In a discussion of research needs in readability, Powers and Kearl (1958) pointed to a number of areas requiring study. One problem mentioned by Powers and Kearl, sampling reliability, was investigated by Clymer (1959), who found that method of sampling had little influence on results for the Spache readability formula and that three samples provided a reliable estimate when primary-science texts were measured.

The research on readability was brought together in a comprehensive fashion by Chall (1958). Her scholarly work is important not only for the information it provides on readability, but also as an illustration of what should be done in many areas of reading.

Additional References: Bloomer (1959); Brinton and Danielson (1958); Felton (1957); Reeve (1958); Repp (1960); Staiger (1958).

Comprehension

In a series of related articles Sochor (1959b), Artley (1959), Eller and Dykstra (1959), and Williams (1959) presented an analysis of theory

and research related to critical reading. The articles, each accompanied by an extensive bibliography, were published together in pamphlet form (Sochor, 1959a).

Letson (1958) attempted to bring new light to an old problem by investigating the relationship of speed and comprehension, considering the purpose of reading and the difficulty of the material. Using two methods of scoring comprehension, number of correct responses and percentage correct of the items attempted (accuracy), he reported a substantial correlation (.77) between number of correct responses and speed of reading easy material, and a moderate correlation (.46) between number of right answers and speed of reading difficult material. When comprehension was measured by accuracy scores, relationships between speed and comprehension were low and negative. Purpose of reading made little difference in the relationship between speed and either measure of comprehension. In a related study, Letson (1959) reported that little adjustment of reading speed was made with a change in purpose. Difficulty of material was more influential in changing reading rate than was purpose. Further study in this area is needed, particularly with contrasted groups of readers.

Maney (1958) and Sochor (1958), in parallel studies, attempted to assess the relationship between general reading ability and critical reading in science and between general reading ability and critical reading in social studies. In both studies, the results led the authors to conclude that general reading ability and critical reading in a content field were not highly related. Unfortunately the authors did not indicate the reliability of their tests so that this factor could be considered in judging the various relationships presented.

Additional References: Cook (1957); Gray (1958); McCullough (1957b); Schwartz (1957).

Factors Related to Reading

Recent studies of eye movements were carefully reviewed by Tinker (1958). His observations indicated (a) a general trend to electrical recording rather than corneal reflection, (b) a lessened activity in the field, (c) at present, a stage of diminishing returns in the value of the research, and (d) no promise of major findings in the future. Gilbert (1959) was much more optimistic than Tinker on the contribution which eye-movement research can make to further understanding of the reading process.

Perception and its relationship to success in first-grade reading were studied by Goins (1958). She investigated two major problems: (a) Does visual training, according to Renshaw, produce an increase in reading ability at the first-grade level? (b) Is performance on visual-perceptual tests at the beginning of grade 1 related to success in reading at the end of the year? To answer the first question, a careful program of visual-per-

ception training, using the tachistoscope, was administered to a well-selected experimental group, and no training of this type was given to the control group. No difference in reading ability existed at the end of the training period.

Goins selected 14 tests of visual perception from the investigations of T. G. Thurstone to test the relationship of perception to first-grade reading ability. Detailed analyses of the results led Goins to conclude (a) that various "types" of perceptual abilities exist and (b) that perceptual tests show significant correlation with success in first-grade reading. A weakness in design should be noted: Correlations of the perceptual tests and reading measures were computed by pooling two schools with greatly different mean IQ's (126 vs. 102).

Mental imagery and reading was studied by Fennema (1959), who asked children to describe a picture they would draw in response to material they had read silently. The number of mental images correlated negatively with intelligence and with reading ability. Since Fennema did not report the directions she gave the children, and a mental image was defined as an action or color not specifically included in the material read silently, the negative correlations may indicate that bright, good readers saw the task as simply reporting what they had read. Further research is needed in this area.

The value of continued reading throughout the summer vacation was demonstrated by Aasen (1959), who compared growth of two groups of children. One group was stimulated to continue reading throughout the summer. A comparable control group did not receive such stimulation. A retest at the beginning of the next school year revealed that the group which read throughout the summer substantially improved its reading ability whereas the control group did not.

Wepman (1960), after examining relationships between auditory discrimination, articulation, reading ability, and intelligence for a group of first-grade and second-grade children, suggested that children be studied at school entrance to determine whether their auditory abilities will permit them to profit from phonics instruction. Grouping children as *auditory learners* and *visual learners* for initial instruction was seen by Wepman as one way to adjust for individual differences in the primary grades.

Additional References: Ahmann and Glock (1957); Bremer (1959); Chansky and Bregman (1957); Entwisle (1960); Gleason and Klausmeier (1958); Hoyt and Blackmore (1960); Karlin (1957); Klare, Shuford, and Nichols (1958); Klausmeier, Beeman, and Lehmann (1958); Krantz (1957); Murphy (1957); Schoonover (1959).

Visual Problems and Reading

Fewer studies have dealt with vision and reading than in previous years. However, the reviews and interpretation of research by Eames (1959) and

Huelsman (1958) reveal that controversial issues remain. One of the basic problems is to evolve a dependable procedure for identifying visual problems before they become related to reading.

Blum, Peters, and Bettman (1959) reported a comprehensive investigation which sought to develop a visual-screening program for use in the average school system. The program aimed to identify children who both ophthalmologists and optometrists agreed needed visual care—agreement being necessary to avoid professional conflicts and to minimize over-referral. In a pilot study both professional groups examined 229 children to determine acceptable clinical criteria. The initial screening procedure included teacher and nurse observation, the Snellen E test, the Massachusetts Vision Kit, the Telebinocular test, and the Modified Clinical Procedure (an abbreviated professional examination).

Four clinical criteria for referral emerged from the pilot study. The number tested each of the three years was 941. Phi coefficients and tetrachoric coefficients of correlation were used to test the relative merits of each procedure. The Snellen E test selected only about one-fourth of the pupils needing referral, but without the cover test, produced a low over-of value. Neither the questionnaire nor the observations proved to be the conclusion was reached that the Modified Clinical Procedure, which proved to be both valid and reliable, was most efficient and therefore most economical.

Among those who were tested in successive years, the only statistically significant change with increasing age was toward more myopia, which was readily identified by the Snellen testing. When all data were considered, the authors recommended that a Modified Clinical Procedure, applied by a qualified professional examiner, be used for all children in grade 1 and all new school entrants thereafter; that others should be screened annually with the Snellen procedure; and that those who failed should be rechecked by the Modified Clinical Procedure.

This investigation was of significance because it brought together optometrists and ophthalmologists; because it was one of the first to establish and apply clinical criteria for referral; and, finally, because it determined the most effective procedure for visual screening at lowest cost. A study of the reading achievement of pupils tested in this way would add materially to insight into relationships of vision and reading.

Walton (1957) related speed of perception to rate of reading. He collated the research in these two areas to determine the upper limit of rate of reading, excluding skimming. First, he reviewed the literature to ascertain the number of letters and letter spaces in words seen tachistoscopically as an estimate of the amount of material that could be taken of time required to move the eyes from one fixation point to the next. Last, he combined data to calculate the maximum possible rate of reading of those who exhibited different reaction times in relation to the number

of fixations. On this basis he concluded that the reading rate for educated adults ranged from 207 to 290 words a minute. However, reducing reaction time and number of fixations, and interfixation time to the minimum reported by investigators, and considering the time required for return sweep, Walton concluded that the highest possible speed of reading was 1451 words a minute.

The foregoing analysis is of special interest because it brings together information from a variety of studies and arrives at an upper limit in reading rate. However, the investigator failed to consider the fact that anticipation of meaning in contextual materials may increase the perceptual span materially. His conclusion should be tested by taking eye-movement photographs of persons purporting to read at higher rates so as to determine the maximal rate when meaning assists the reader.

Additional References: Gilbert (1959); Robinson and others (1960).

Remedial Reading

The constant search for causes of reading retardation continued. Vernon (1957) brought together and interpreted the research, dealing first with visual and auditory perception in reading and later showing how these factors limited speech, cognitive ability, and reading progress. In addition, she reviewed research dealing with innate, acquired, and environmental factors which interfere with reading progress. She concluded that reading is such a complex process that interferences of many kinds and of different degrees may combine to cause problems.

In direct contrast was the study by Smith and Carrigan (1959), who rejected the multiple-causation theory and searched for a single one which might account for nearly all problems. Accumulation of the symptoms of selected cases led them to theorize that all reading disability could be attributed to the balance and level of acetylcholine and cholinesterase at the junctions of the neurons. They tested this model, using 15 physical-psychological and educational tests with 701 of the lowest readers in grades 7 through 9. After raw scores were converted to *T* scores, a coefficient of profile similarity was computed for some children, and a cluster analysis led to the placement of each pupil in one of five groups. A medical analysis of 41 cases was essentially negative. Nevertheless, by implication from test performance, approximately 40 children were characterized by the dimensions mentioned earlier. When the authors were unable to classify pupils by these dimensions alone, anxiety was added. Multiple-vitamin capsules, Cytomel, and Miltown were administered to members of different groups who at the same time were tutored in reading. The reading gains made were attributed to the medication, and the authors concluded that their model constitutes a useful theory.

An excellent review of this book, by Harris (1960), pointed out fundamental weaknesses in definition of reading disability, in limitation of tests used, in statistical treatment of data, in remedial procedure used, and fi-

nally in inferential reasoning relied upon to reach conclusions. Other reviews have confirmed the distinct limitations of this study, and as a result it should still be considered a theory needing adequate testing.

A second report supplied a neuropsychological explanation for reading disability. Delacato (1959) attempted to identify traits common to 45 boys ages 8 to 18 who applied for diagnosis and remedial instruction in a summer clinic. He found that 29 traits were not common to the group, four were fairly common, five were common, and seven were universal. Among the most common traits were reversals in reading and writing, poor spelling, inability to learn to read by a sight or phonetic method, higher vocabulary than comprehension scores on tests, and very slow rate of reading. Pupils disliked reading, had more difficulty with small than with large words, and later did poorly in English in secondary school. The foregoing symptoms were interpreted as being in the neurological realm.

Review of the research in neurological problems related to reading led Delacato to conclude that dealing with language required integration of the whole individual at the most efficient level—that of unilaterality. For prevention and correction, therefore, he suggested making the dominant hand most skilled, strengthening the dominant eye through occlusion, developing a dominant foot, and deleting tonal activity (including oral reading). Case studies were offered in support of the treatment.

The traits which Delacato offered as common to retarded readers are familiar to anyone who has had experience in a reading clinic. Furthermore, a large proportion of such pupils are taught to read without corrective procedures in establishing dominance. Therefore, clinical experience does not support his single-cause theory of reading disability.

Harris (1957) also investigated the laterality of 316 clinic cases and 245 unselected subjects 7 to 11 plus years of age. The Harris Tests of Lateral Dominance, knowledge of left and right, and simultaneous writing were used to determine differences in the two groups. He found, with increase in age, a greater increase in lateral dominance among the unselected subjects, and also in preference for the right hand. Directional confusion was significantly more common to poor readers at age seven, but by age nine the two groups had converged in this particular. Tests of eye and foot dominance did not distinguish between groups. He concluded that the preference for one hand developed slowly, indicating a maturational lag, perhaps of a neurological nature.

Another report of factors related to reading disability was made by Kawi and Pasamanick (1959). They examined records of prenatal histories as well as selected items of postnatal histories of 205 male reading-clinic cases and an equal number of matched controls. They were particularly concerned with evidence of minimal cerebral injury which might distinguish the two groups. The two groups were classified according to sociometric deciles. Then the presence or absence of complications of

pregnancy, delivery, the neonatal period, and prematurity were recorded. Differences between the two groups in socioeconomic status which may have been related to the selection of subjects emerged. Of special interest was the discovery of a significantly higher proportion of premature births among the retarded readers. Also, abnormalities of the prenatal period occurred more frequently among retarded readers. This study was as carefully controlled as possible considering the facts that the pupils were about 10 years old and that for many of them birth records were not complete. The authors recognized this limitation and furthermore did not attribute reading disability to the factors they identified.

Previous investigations have shown multiple deficits of retarded readers when many factors were considered. It is not surprising, therefore, to find the deviations from expectancy shown by the foregoing reports, each limited to selected areas.

Additional References: Aaron (1960); Anderson (1958); Bliesmer (1958); Bolling (1958); Durkin (1960); Ewers (1957); Fry (1959); Hill (1960); Leavell and Beck (1959); Moe and Nania (1959); Morrison and Perry (1959); Natchez (1959); Newton (1959); Plattor and others (1959); Raygor, Vance, and Adcock (1959); Roberts and Coleman (1958); Stake and Mehrens (1960); Tabarlet (1958); Wilson (1959).

Summary

The research in reading during the last three years is impressive in both its quantity and diversity. Yet much remains to be done. The important problems of what changes take place in the individual when the ability to read is acquired, the mental processes involved in reading, and the techniques of learning used by successful achievers are still relatively unexplored areas. Outer space is not the only frontier. Reading qualifies, too.

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CHAPTER III

Listening

SAM DUKER

AN INCREASE in interest in the nature of the listening process and in the best procedures for teaching efficient use of this process has marked the past three years. This increase has not only been quantitative but also has been evidenced by broadening inquiry into new aspects of the subject. As is true of inquiry about any new area, research on listening has not been co-ordinated, and as a result there tends to exist duplication and often a lack of acquaintance with previous studies. There has been an amazing increase in space allotted to listening in textbooks on speech and language arts as well as in recent curriculum bulletins. Unfortunately, the material often fails to reflect the results of investigation.

This chapter does not deal with studies of hearing, of the mass media, or of listening to nonverbal sounds such as music, except as they can be related to verbal communication. It is confined to research dealing with listening to the spoken language. Such research occurs in the fields of English, education, speech, psychology, and sociology.

Summaries and Bibliographies

An extensive bibliography on various aspects of listening was prepared by Nichols and others (1957), who classified references by type of publication rather than by topic. Keller (1960) and Toussaint (1960) reviewed research done during the past decade. Keller saw substantial progress in testing and teaching methodology but also saw need for more attention to the thought processes that take place during listening. Toussaint thought further investigation desirable into the administration of listening tests by mechanical means, the aural approach to teaching a number of subjects, and the reasons for contradictory findings of existing research.

Early (1960) called attention to the growing interest in the teaching of listening and to some of the research dealing with the importance of listening in human communication. Broadbent (1958), who has long been interested in the psychological aspects of the auditory process, contributed an extremely valuable review of the research in this area. He reviewed research on selective listening, one-channel and two-channel listening, the effects of noise, the nature of extinction, and individual differences. He concluded that many of the phenomena discovered by the studies he reviewed can best be explained in terms of information theory.

Additional References: Harris (1958); Jeffress and Moushegian (1959); Laurence (1957); Rubenstein and Aborn (1960); von Békésy (1960).

Tests

The Educational Testing Service (1956-57) produced two forms of a four-level test intended for use in grades 4 through 14. This was the first published test designed for use below grade 11. It was part of a battery of tests in many subject areas and has had wide use. Published research on its validity and on its other aspects is still lacking. Reviews by Lorge (1959b), Lindquist (1959b), and Jackson (1959) were critical of the size of the sample used in establishing norms and also questioned validity. Reviews by Lorge (1959a) and Lindquist (1959a) of the *Brown-Carlsen Listening Test* tended to be critical of procedures used in devising the test.

Hayes (1957), after analyzing 10 reading tests for beginners, constructed a listening test for use in the primary grades. Her study is a model of careful, scholarly preparation of test items and of rigid test evaluation. Test questions include vocabulary and sentence completion items. Launderville (1958) devised a listening test for use in the reading-readiness stage. She found that the results of her test correlated significantly with reading achievement a year later and concluded that the test might have value as a predictive instrument. Moe (1957) performed a similar experiment with a smaller number of subjects but failed to find that listening performance was a significant predictive measure of later reading achievement.

Haberland (1958, 1959) found that results obtained on the *Brown-Carlsen Listening Test* corresponded closely to the results on the aural portions of various reading and intelligence tests. He also found that administration of this test by persons trained in speech did not yield results significantly different from those obtained when the test was administered by persons not trained in speech.

A phase of listening previously neglected by test constructors was investigated by West (1958), who developed an instrument to measure critical or evaluative aspects of listening. Testees were asked to identify the theme, the action suggested, ideas offered, and supporting material in a given presentation. Although this effort was, admittedly, only a beginning, it was a valuable step toward the evaluation of this crucial aspect of good listening.

Nature of the Listening Process

The relationship between the abilities involved in listening to music and to language was explored by Wilson (1960). Analyzing listening and intelligence tests taken by 369 pupils in grade 6, he reported correlations between music and language listening of .16 to .40. He found that pupils in the upper quartile in listening to language tended to have significantly higher scores in listening to music than did those in the lowest quartile. This study has great potential significance in determining

the validity of the concept of *auding*. Plessas (1957) found a significant positive relationship between high listening scores and scores in reading and intelligence tests.

The relative effectiveness of listening and reading as a means of learning continued to fascinate researchers. Witty and Sizemore (1958, 1959) reviewed almost 100 studies dealing with this question and concluded that the contradictory findings could best be explained by recognizing that efficiency in learning depends not nearly so much on the mode of presentation as on a complex of other factors. King (1959) tested 475 last-term primary-school pupils in England and reported no sharp differences between listening and reading comprehension. He confirmed previous findings that boys seem to favor the auditory approach more than do girls. Gray (1958), in an elegantly designed study, found no differences in a test comparison of reading and listening to poetry. He tested grasp of central meaning and of central and metaphysical images, as well as overall understanding and ability to make critical comments.

An extensive résumé of the art of listening from the psychiatric standpoint was prepared by Barbara (1958). He found various kinds of listening, types of bad listening habits, and a relationship between listening and personality. Bossard (1958) made tape recordings of 200 family dinner-table conversations and analyzed them to show the importance of listening.

Kegler (1958) investigated the reading and listening vocabularies of 211 high-school students. To ensure careful measurement he used individual intelligence tests. He found no support for previous findings that those of high intelligence tended to possess larger reading vocabularies than listening vocabularies, but saw some indication that students with low ability tended to possess larger listening vocabularies than reading vocabularies.

Diehl, White, and Burk (1959) changed the speed of delivery of passages from 145 words per minute to 172, 160, 135, and 126 words per minute by altering only the pause time between sounds and words. They reported no differences in comprehension. Brown (1959) investigated anticipatory sets to listening and reported no significant differences for different sets. Brown also found no differences in listening efficiency between subjects who had a theoretical interest in listening and those who had not.

Additional References: Bird (1960); Greif (1958); Hast (1958); Nichols (1960); O'Connor (1959); Smith (1958); Strickland (1958); Triggs (1957); Westover (1958).

The Place of Listening in Teacher Training

On the assumption that listening is not likely to be taught effectively at the elementary and secondary levels unless its teaching is included in teacher-training programs, Markgraf (1960) made a questionnaire study

of 411 member schools of the American Association of Colleges for Teacher Education. Directing 1111 questionnaires to speech, English, and education departments, he obtained a remarkably high return. A total of 839 returns were received from 406 of the 411 colleges solicited. Courses for credit in listening are offered at the University of Minnesota, Bradley University, and Western Michigan University. In 88 out of 188 speech-methods courses, a special unit on the teaching of listening is included. He found also that 92 out of 214 English teaching-methods courses and 188 out of 258 elementary-school-methods courses included units on the teaching of listening. A valuable summary giving status of the teaching of listening at each of the responding institutions was included by Markgraf.

The Teaching of Listening

Most research studies during the period under review were concerned with ways of teaching listening skills. The most novel approach was in the film, *Effective Listening*, developed by E. C. Conboy and William A. Buehler (1959), in which a large amount of information about the listening process is compressed into a well-made, 15-minute film. Nichols and Cashman (1960) stressed the importance of teacher attitude and example in the teaching of listening. Russell and Russell (1959) performed a most useful task in gathering together various techniques for teaching listening skills in the elementary school, classifying them by grade level and by types of listening.

Additional References: Canfield (1958); Clark (1958); Dow (1958); Early (1958); Fulton (1959); Giffin and Hannah (1960); Hosey (1959); Kelly (1958); Lewis (1960); Nichols (1960); O'Connor (1959); Smith (1958); Terango (1959); Wagner (1957); Wagner and Hosier (1959); Wehr (1957).

Summary

Listening as an area for research has reached a new stage of maturity during the past three years. There remains, however, much to be done. Results obtained from studies using inadequate samples, unsuitable techniques, and unsophisticated analyses tend to be contradictory. Confusion rather than clarification is the result. Probably as a result of the recency of interest in the importance of listening, many research reports contain a large amount of exhortatory material presented with missionary zeal. This seems superfluous and inappropriate. Studies characterized by better experimental design and more careful analysis could do much to point the way to the most productive ways of teaching listening skills. Now that past research has laid a good foundation of educational and psychological principles on which future work can be based, it is to be

hoped that the next three years will produce research more rigorously performed.

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CHAPTER IV

Speaking

J. JEFFERY AUER and RAYMOND G. SMITH

THIS CHAPTER seeks to highlight reports of significant investigations appearing in speech publications during the past three-year period. Fortunately, the area is adequately indexed, and studies not noticed here can readily be found.

Bibliographies, Reviews, and Indexes

Gray (1957) indexed 250 doctoral dissertations in drama, speech education, and the sciences basic to speech. Auer's (1958, 1959a) listing of doctoral dissertations in progress continued a series that has been published annually since 1951. This series complements that of Dow (1958, 1959, 1960), consisting of 500-700 word abstracts of completed doctoral dissertations, which has appeared annually since 1946. A companion index by Knowler (1958, 1959, 1960) presented numerical summaries of all graduate degrees by author, title, school, and subject matter; it has been published annually since 1935.

Annual bibliographies in rhetoric and public address, edited by Cleary (1958, 1959a, 1960), have appeared since 1951. Numerical and percentage summaries by author, institution, content area, and research method for the three Speech Association of America journals of the period 1935-58 were published by Brooks (1959). An index to *Speech Monographs*, 1934-59 (Gray, 1960), appeared as a special issue of that periodical in 1960. Auer's (1957) bibliography for American Studies programs includes many additional references.

Auer's (1959b) was the first text specifically designed to introduce graduate students to research methods and techniques in speech. Although not itself a bibliography, it contains comprehensive summaries of bibliographical material. Clevenger (1959) reviewed research on stage fright, most of which appeared in speech publications, and offered interesting hypotheses concerning interrelationships among common subjective, objective, and physiological measures of the phenomenon. All in all, the bibliographical and review sources available in speech are numerous, comprehensive, and well diversified.

Historical-Critical Studies

Numerous investigations dealt with the theory of rhetoric and the practice of public address. Recent rhetorical studies included the "recovery" of obscure treatises: Nadeau (1958) translated Hermogenes' second-century *On Stases*; Brennan (1960) traced the genesis of Susenbrotus'

1541 *Epitome Troporum ac Schematum*; and Ong (1958a, b) contributed a definitive inventory of the writings of Peter Ramus and Omer Talon as well as a major study of Ramus' life and works. Critical re-evaluations of traditional treatises included Black's (1958) on Plato's *Gorgias* and *Phaedrus* and Bitzer's (1959) and Mudd's (1959) on Aristotle's view of the enthymeme. Fresh analyses of standard rhetorics included Bitzer's (1960) defense of Campbell's 1776 doctrine of evidence, and Cohen's (1958) explication of Blair's 1783 concept of aesthetics in rhetoric and belles-lettres.

Less well-known figures were treated in Wagner's (1960) definitive introduction to Thomas Wilson's first complete rhetoric in English in 1553, Cleary's (1959b) review of Bulwer's Renaissance works on expressive action, and Brigrance's (1958) interpretation of Descartes' impact on the language of contemporary speech. Howell (1959) introduced other early writers in a study of the elocutionary movement in England, establishing its origins within the 1700-48 period rather than the accepted post-1750 era.

Other studies focused on rhetorical implications in writings of scholars from related disciplines. Hochmuth (1958) assayed the contributions of I. A. Richards to a general theory of communication; Torrence (1959) related rhetoric to philosophical inquiry in the works of Bertrand Russell; and Brockriede and Ehninger (1960) applied the logical formulations of Stephen Toulmin to a classification and analysis of rhetorical arguments. Langer (1960) wrote perceptively of post-Darwinian concepts of the origins of speech and its communicative function.

Finally, a number of studies examined the role of rhetoric in education. Phillips (1959) explored public speaking in the Talmudic academies of Babylonia, A.D. 50-500; Oliver (1959) traced the rhetorical tradition in the Confucian schools of Korea, 1392-1910; Lang (1958) reviewed rhetorical training in the Port-Royal *petites-écoles*, 1646-60; Gillis (1959) examined speech instruction in eighteenth-century and nineteenth-century Jesuit education; and Reid (1959) reported on the 1806-1904 history of Harvard's Boylston Professorship of Rhetoric and Oratory.

Research in public-address history is classifiable by scope and emphasis. First are comprehensive studies of individual speakers. Notable in the period under review is a series on British orators: Reid (1957) on Fox, Arnold (1958) on Lord Erskine, Lomas (1958) on Churchill, Austen (1958) on Gladstone, Wood (1958) on Macaulay, C. D. Smith (1959) on Lord North, and Stelzner (1959) on Morley.

In a second category fall limited studies of individual speakers. Crowell (1958) analyzed five speeches of F. D. Roosevelt to ascertain the extent and nature of his *ad libitum* changes from prepared texts; Windes (1960) went behind the 1956 utterances of Stevenson to reveal the personnel of his "speech staff," its methods, and its contributions. Linkugel (1959) reviewed the stump speaking of Seymour in 1868 as he defied a tradition

of passive presidential campaigning; and Spalding (1959) concluded that W. J. Cameron was the voice of "nineteenth-century liberalism" on the "Ford Sunday Evening Hour," 1934-42.

Regional and period studies were represented by Martin's (1957) analysis of the characteristics of speech style in the ceremonial oratory of the "Golden Age" of American speaking, 1800-50, and by Hudson's (1958) characterization of rhetorical invention as "sacred logic" in Colonial New England preaching.

Studies of speakers for a common cause included Kerr's (1959) review of "the rhetoric of political protest" as reflected by Father Coughlin and Congressman Lembke in the 1936 Union Party campaign. Quimby and Billigmeier (1959) took a longer historical view, analyzing American Protestant evangelism, its pre-Graham revivalistic preaching by Finney, Moody, Sunday, and others. The highest standards in historical-critical research were met in Gunderson's (1957) book-length analysis of "The Log-Cabin Campaign" of 1840.

Case studies of single speeches, *in situ*, continued a fresh approach to public-address history, blending careful accounts of the specific audience and occasion with those of the speaker and his communication. Richards (1958) applied this technique to John Marshall's judiciary speech in the 1788 Virginia Federal Ratifying Convention; Thomas (1959) did the same in a study of the prosecuting speech of Benjamin F. Butler in Johnson's impeachment trial; and Vasilew (1957) investigated the experience of Norman Thomas before what he described as "the only completely hostile audience . . . I ever faced," at the 1936 Townsend Convention.

Another kind of public-address research centered upon special speech types and occasions. Martin (1958) rejected sophisticated maligning of the traditional Fourth of July oration and found this speech type a unifying rhetorical force, homogenizing popular national values in nineteenth-century America. Miles (1960) explored the tradition of the national nominating convention keynote speech and identified its common themes. A special focus, involving textual analysis and collation, appeared in Erdman's (1960) study of the quality of parliamentary reporting by Coleridge and his contemporaries in 1800.

A few studies dealt directly with the process of criticism. In his treatment of John Morley, Moore (1958) added substance to the idea that English historians excel as public-address critics, and Baskerville (1959) approached the same conclusion by identifying "dramatic" and "literary" emphasis in much American criticism. Murphy (1958), however, argued that literary evaluations of speeches can be as solidly based as social or historical ones.

Special notice should be taken of a volume devoted to the rhetorical idiom, edited by Bryant (1958), and dedicated to Herbert August Wichelns. It includes 18 studies of high merit, covering the whole field of rhetoric and public address.

Tests, Measurements, and Research Instruments

The circuitry and physical structure of a new audience-response analyzer were described by Brockhaus and Irwin (1958). This instrument periodically samples listeners' conscious responses throughout a program. Flexibility and modest cost make it a promising technique for obtaining a profile of audience response.

A description of methodology used in developing a new intelligibility test (but not of the test itself) was presented by Asher (1958). Tests for appraising the reliability of a group of practiced judges evaluating samples of children's articulation were compared by March and others (1958). Several refinements in the measurement of stage fright through chemical reactions to palmar and finger-tip perspiration were reported by Brutton (1959). Brutton's procedure involved the reaction between soluble ferric chloride and mimeograph paper treated with tannic acid, and his contributions were in refinements of technique.

The first report of an investigation using the promising new *Osgood Semantic Differential* as a measuring instrument was made by Nebergall (1958), who compared listeners' received connotative meanings with speakers' intended meanings. A second study by R. G. Smith (1959) replicated Osgood's factor-analytic work with data drawn from the general speech field to yield a research instrument designed specifically for speech. Working with the Osgood instrument, Thomas and Ralph (1959) found the evaluative scales to furnish a valid index of attitude shift. The semantic differential in specially adapted forms seems to hold real promise for quantifying and analyzing complexities of the communicative process.

Weaver (1959), with a semantic scale of his own devising, concluded that intelligence is approximately four times as effective as social-attitude score in relation to academic achievement of twelfth-grade pupils. Increasingly greater numbers of measuring devices are being developed for the speech field.

Additional References: Crocker (1958); Douglas (1958); Laase (1958).

Quantitative Studies

Investigations directed toward identifying and quantifying the underlying acoustical phenomena constituting speech signs also appeared with greater frequency in research literature. In general, these have been soundly conceived and carefully executed studies. Using analysis of variance, for example, Harbold (1957) concluded that "... discrete magnitudes of interphonemic transitional influence exist as entities ... and can be differentially recognized and identified" (p. 297). Kretsinger and Young (1960) compared the intelligibility of speech output submitted to two types of electronic intensity control and found "limiting" to produce

higher scores in the presence of competing noise than "clipping." A study by Leith and Pronko (1957) added considerably to information concerning the disintegration of speech (rate and intensity) in response to stress created by delayed auditory feedback. In another "microscopic" study Summers (1958) found significant differences for eight vowel sounds at various pressure levels for both internal nasal and combined external oral-nasal sound pressures.

Among the "microscopic" investigations was one by Diehl, White, and Burk (1959) which corroborated the conclusion that speech-rate alteration within the normal delivery range does not appreciably affect comprehension. Moses (1959), using the type-token ratio as a measure, found additional evidence to support the belief that writers use a more diversified vocabulary than do speakers.

Several speech-personality relationship investigations were made, including one by Mallory and Miller (1958) in which biserial correlations between dominance and introversion and pitch, loudness, resonance, and rate were made. Slight but significant correlations were found between some of the pairs. The relationships between personality traits and discussion behavior were investigated by Scheidel, Crowell, and Shepherd (1958); the results suggested "notable relationships between such personal characteristics as self-confidence, independence, and dominance and the 'Individual Prominence' dimension of discussion behavior." With a somewhat different approach, Utterback and Fotheringham (1958) found inconclusive relationships to exist among discussion-group size, length of discussion, and degree of moderation.

Ball (1958) explored the relationships between rated speaking ability and measures of the factors of verbal comprehension and general reasoning. Low but significant correlations were found for the male subjects. Hovland (1957) and Hovland and Janis (1959) added two collections of experimental studies to their significant series on mass communication and persuasion, the first dealing with the effects of sequences of presentation, and the second with individual differences in persuasibility.

Finally, mention should be made of Peterson's (1958) excellent summary evaluation of the present status and outlook for quantitative research; he pointed up the eclectic and interdisciplinary nature of speech, warned against the inherent weaknesses of single-avenue approaches, and advocated sound basic-research programs.

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CHAPTER V

Composition, Handwriting, and Spelling

JOHN J. DEBOER

THE MOST RECENT summaries of the teaching of writing appeared in the *Encyclopedia of Educational Research*, third edition (1960)—Harris on handwriting, E. Horn on spelling, and Searles and Carlsen on English—and in a series contributed by the National Conference on Research in English to *Elementary English*. In the latter, Parke (1959) summarized research on composition in the primary grades; Edmund (1959), on composition in the intermediate grades; T. Horn (1960), on spelling; Herrick (1960), on handwriting; DeBoer (1959), on grammar in language teaching; and Strickland (1960), on the evaluation of children's composition. The series was edited by Burrows (1960) and published as a bulletin by the National Council of Teachers of English.

The *Fifth Mental Measurements Yearbook* (Buros, 1959) listed and reviewed new tests in the field of written expression. Letton (1957) annotated references on research in elementary language arts, and Anderson and Staiger (1957) listed research studies completed and in progress in 1956. Phi Delta Kappa published lists of *Research Studies in Education*, both those in progress and those completed (Jensen, Lyda, and Good, 1957; Lyda and others, 1958; Lyda, Anderson, and Good, 1959), including many in the language arts.

Curriculum and General

Furness (1957), evaluating trends in the teaching of English, cited the decline in the relative number of teachers of English, with the resultant assignment of English classes to home-economics, physical-education, and other teachers; the low subject-matter requirements for teachers of English in many states; and the tendency to underemphasize humanistic values in core courses. On the other hand, Mersand (1958) saw numerous favorable developments in the teaching of English. Among these were extensive efforts at curriculum revision, typified by the work of the Commission on the English Curriculum of the National Council of Teachers of English; improved articulation among the various school levels by means of meetings which include elementary, high-school, and college teachers; increased individualization of instruction through special programs for the gifted and the slow learners; the use of TV and other audio-visual aids; closer relationship between teacher and supervisor; greater utilization of extraclass experiences to enrich the student's background of experience; attendance at summer workshops and national

meetings; and the organization of regional associations of teachers of English.

Winter (1957) found low correlations among such factors as motor ability, oral language, drawing, writing, reading, and spelling in first-grade and second-grade children. She properly cautioned teachers and others not to proceed on unexamined assumptions about the interrelationships of the various abilities of young children.

The Teaching of Composition

Research on the teaching of composition is particularly difficult because of the highly subjective nature of the product. Nevertheless, numerous investigators have had the temerity to study ways in which writing skills may best be cultivated. For example, Carlson (1959) compared two methods of teaching intermediate-grade children to write original stories. Fourteen hundred samples of children's writing were evaluated. Using two specially designed scales with equated groups, Carlson found that the use of a variety of stimuli including multisensory experiences, pictures, literature, and toys resulted in greater fluency and originality than did the use of story titles alone.

Halvorsen (1960) studied randomly chosen compositions and responses to an attitude inventory to determine whether emphasis on stimulation or on mechanical accuracy was more effective in producing compositions of high quality. She concluded that the "mechanics group" wrote significantly shorter sentences and made significantly fewer errors in spelling than the "stimulus group." The "mechanics group" improved in paragraph structure, whereas the "stimulus group" improved in plot development—suggesting that children learn specifically what they are taught.

Home background and frequency of experience with written expression are commonly regarded as important factors in the improvement of composition abilities. Two controlled experiments lend support to this view. Buxton (1958) made a careful study of the progress of 257 college freshmen, using the Mechanics of Expression and the Effectiveness of Expression parts of the *Cooperative English Test*. He employed three equated groups of approximately 85 each. The control group (C) was taught the same subject matter as the other two groups. Members of the second group (W) wrote 500-word essays weekly for 16 weeks and received them back each with only a short paragraph of criticism. Members of the third group (R) also wrote weekly essays, but received them back with all errors indicated and with commentary on each paper as a whole; this group devoted from 30 to 50 minutes of class time each week to discussion and revision. The first and final essays were independently evaluated by two experienced teachers of English. The reliability of the scoring by these teachers was .90. The results indicated no differences among the three groups with regard to the Mechanics of Expression part of the test. The Effectiveness of Expression test scores of both the R and W groups

were significantly higher than those of the C group. However, the R group, which devoted much time to discussion and revision, was superior to the W group on such matters as title, introduction, sentence variety, fluency, and diction. There was no indication of superiority of any one group over another in critical thinking, originality, or organization.

Pippert (1959) examined the mechanics of written language of graduates of four Wisconsin high schools immediately before, and five years after, graduation. In this study the girls made significantly fewer errors than boys in both the earlier and the later scores. The predictive efficiency of the scores ranged from 3 to 11 percent, with correlations ranging from .23 to .45. In other words, if the measures were both valid and reliable, it is not possible to make accurate predictions of future performances on the basis of high-school test scores. Incidentally, the most common errors of all four groups had to do with capitalization, end punctuation, separating sentence elements, and spelling.

One of the most interesting new developments in the teaching of composition is the use of lay readers of students' writing. Diederich (1960), for example, reported on a plan for reducing class size. The National Council of Teachers of English, along with state organizations of teachers of English, suggested a total load of 100 pupils per teacher, in order that more supervised writing might be made possible. Diederich thinks that the load of the teacher of English will increase rather than decrease, and that unless drastic changes are made students will write, on the average, not more than four papers a year. He noted that it takes 33 hours to grade and correct 200 papers at the best rate good readers are able to maintain. He observed that whenever the teacher's load has approached this 200-students-a-day figure, the average number of papers written and corrected per year has approached four. Under the Diederich plan, supported by the Ford Foundation and developed by a 1959 workshop, the high-school English teacher meets no more than 25 students at a time. Of the five periods typically available per week, two are devoted to "free reading" and one to a test and a follow-up of self-correcting homework. The free reading is done in groups of more than 200 students in temporary buildings designed for that purpose and is directed by teams of specially qualified college-educated housewives. Students write a paper every two weeks. In the course of a year, three-fourths of a student's papers are read by college-educated lay readers, one-fourth by regular teachers of English. The issue presented by the Diederich study is whether conventional practices, with generally reduced class size, shall continue, or whether ingenious compromises are to be made as the expected increases in school enrollments occur.

In a series of studies of children's creative writing, Edmund (1958a, b, c, d; 1959; 1960) undertook to find the relationship between children's writing and their prior experiences, their interests, and their personal problems and fears. These studies were also discussed in the *Elementary*

School Journal (1957). On the question of prior experiences, the children in grades 5, 7, and 9 appeared to write more creatively from *derived* experiences (that is, those encountered in reading, radio, TV, and the like) than direct personal experiences. The tendency to employ direct experience in creative writing increased as the children moved up in the grades. Edmund properly suggested that pupils be taught to make greater use of direct personal experiences. In another study, involving fifth-grade pupils, he found that only 20 percent made use of their general interests as topics for themes. The problems which the children listed, and which nearly all ignored in their writing, included (a) failing school work, (b) getting along with siblings, (c) making and keeping friends, (d) appearance, and (e) shyness and nervousness. The fears which these children admitted but did not write about included (a) darkness, (b) failing school work, (c) snakes, (d) dogs, and (e) death and personal injuries.

Edmund further surveyed the writing interests of 187 pupils in grade 7. The children's interests were distributed as follows: 25 percent in trips and travel; 20 percent in adventures; 13 percent in pets or animals; 10 percent in ghost stories; 9 percent in fiction; others in miscellaneous topics. Edmund concluded that most children are capable of choosing subjects independently.

In two articles, Fitzgerald (1959a, b) discussed the use of prefixes and suffixes as means of introducing children to new words to employ in their writing. His analysis revealed that about 840 words (more than 31 percent of the 2650 basic writing words) are derivatives formed from base words or roots by the addition of simple suffixes. Fitzgerald points out that the need for derivatives formed from prefixes increases greatly from childhood to adulthood, when about one-fourth of the writing vocabulary is made up of prefix derivations.

Additional References: Adler (1959); Callahan (1959); Kraus (1959); McIntire (1958); Smith (1960); Wittick (1960); Witty (1957); Witty and Blumenthal (1957).

The Evaluation of Writing Abilities

Little substantial evidence has appeared within the last three years to indicate progress in the objective evaluation of students' writing abilities. At least one study is of interest. French (1957) reported that although essay tests of English composition have been found to be somewhat less reliable and valid than objective tests, many teachers believe that essay tests are justified on grounds other than prediction of success in college English. French also found that, in the opinion of teachers, (a) writing practice has increased in the schools in the last 10 years and (b) the essay test of the College Entrance Examination Board has not been responsible for any change in their methods.

Additional References: Grissom (1959); Scales (1958).

The Teaching of Grammar and Usage

Apparently the scholarly articles and books which set forth the descriptive or "usage" principle of language have not yet made headway among high-school teachers of English. Pooley (1957), for example, conducted a poll of 20 experienced teachers of English from various parts of the United States, including chairmen of English departments in high schools, supervisors of English, and past and present officers of the National Council of Teachers of English, in an effort to secure their estimates of teachers' attitudes toward grammar, as reflected in classroom practices. He reported that "the majority of teachers hold the view that 'grammar is the means to improved speech and writing. . . . Grammar skills are best gained by learning the parts of speech, the elements of the sentence, and the kinds of sentences. . . . Drill and practice from textbooks and workbooks establish grammar, which will then function in composition'" (p. 51). A survey by Womack (1959) confirmed Pooley's findings. Items taken from the Leonard study and other scholarly sources were included in Womack's questionnaire. Womack reported that teachers of English feel obligated to hold a conservative view of questions of usage and language change, and he gave abundant evidence of this conservatism among them.

Kraus (1957), comparing three methods of teaching sentence structure, confirmed the findings of two generations of investigators. Working at the Eugene, Oregon, high school, she set up six experimental classes in grade 11 for the purpose of determining which of three methods was superior in helping students to express their thoughts clearly. The first method consisted of the logical presentation of five units on sentence structure. No original writing was required. All activities were concerned with the study of sentence structure. In the second method, the same procedure was followed, except that students wrote weekly themes which were not discussed with them after the themes were returned. In the third method, all items involving sentence structure were taught in connection with errors made in the writing of weekly themes. In all three methods the following aspects of sentence structure were studied: completeness, co-ordination, subordination, clarity, and effectiveness.

Kraus found that all three methods resulted in significant gains in the ability to choose correct alternatives in punctuation and usage, but that the third method attained its objective in one-third of the time required by the others. She concluded that effective teaching involves (a) explanation of sentence structure in relation to the idea to be expressed, rather than grammatical rule; (b) opportunity for students to work on the items most difficult for them; (c) discussion with students about experiences on which they are to write; and (d) teaching elements of sentence structure for which the student's writing indicates a need.

Additional References: *Baltimore Bulletin of Education* (1959); Monk (1958); Ridgway (1959); Sexton (1959).

Linguistics in the English Program

The controversy over "structural grammar" continues. The structural approach, developed earlier by Fries, Whitehall, Roberts, and others, studies the English sentence from the point of view of pattern, word order, and formal clues. It departs sharply from the earlier and still dominant practice of employing the concepts, categories, and terminology of Latin grammar.

Mallis (1957) used the "patterns" method in his high-school junior English class. His purpose was (a) to help the slow students and those with little grammar background over the psychological hurdle, (b) to review fundamentals for the forgetters, and (c) to challenge the superior students with a new way of handling material they already knew well. He reported that, as a result of 15-minute daily lessons, the students' writing became clearer and more vivid; slower students discovered a framework within which they could develop a complete thought; and students took greater care in stating ideas. Similar favorable results for the new grammar were reported by Senatore (1957). He cited particularly the advantage of the reduced number of grammatical terms which a student must learn, identify, and use.

Alva (1959) found that about 4 percent (120) of the teachers in 88 high schools of California were using the method. Most of these teachers had had one or two college courses in linguistic science. Many of them combined the traditional and the descriptive approaches. Slothower (1959), studying the extent of use of structural linguistics in English-language courses for prospective teachers of English, found that among American colleges requiring grammar study of prospective teachers of English, 22 percent reported giving "considerable" attention to structural grammar; 9 percent, or 20 institutions, reported exclusive use of the structural approach. Since usable replies were received from 91 percent of the 395 institutions addressed, these percentages are significant. In view of the recency of the structural-grammar movement, they appear high.

Additional References: Malmstrom (1958); Marckwardt (1958); Simonini (1958); Williams (1959).

The Teaching of Handwriting

In addition to the general summary of research on handwriting by Herrick (1960), numerous studies were published. Two dealt with the question of cursive and manuscript handwriting. Freeman (1958), surveying cities with a population of 10,000 or more to determine present practices, found that, although in most school systems the changeover from manuscript to cursive is made in grade 3, a sizable minority makes the change in grade 2. Foster (1957) compared cursive and manuscript writing of middle-grade children who had made the transition from manuscript to cursive in grade 3 or later. He concluded that (a) manu-

script writing is slightly more legible than cursive; (b) children who write legibly in one style write legibly in the other also; (c) children write more rapidly in cursive than in manuscript; (d) children in the middle grades increase rapidly in rate of writing by either style.

Harris and Rarick (1957, 1959) found that an individual's use of his normal rate of writing results in a minimum of "point pressure" and greater legibility. Enstrom (1957), using data from questionnaires answered by a large sample of teachers, found that 11.14 percent of pupils (12.5 percent of boys, 9.7 percent of girls) write with the left hand. Quint (1958), studying 626 children in grade 6, found that children of high IQ dislike handwriting practice less than those of low IQ; that aversion to the act of writing is related to motor ability; and that there is no significant difference in attitude toward handwriting between right-handed and left-handed children.

Types of personal handwriting of children in grades 6 to 9 were analyzed and classified by Seifert (1959). One-third or more at each grade level showed evidence of a personal style. Of those who used the personal style, the mean speed scores ranged from 60 letters per minute in grade 6 to 88 letters per minute in grade 9. There was no correlation between motor co-ordination and personal style or between intelligence and personal style, except among some ninth-grade pupils who apparently showed a relationship between intelligence and a personal style of handwriting.

Templin (1959) studied the legibility of the handwriting of 454 adults trained in three styles: all manuscript, all cursive, and manuscript-cursive. She found that most males, once exposed to the manuscript style of handwriting, continue to make use of it in their adult lives. She questioned the efficacy of our dual system of handwriting instruction. Likewise, Hildreth (1960), in a detailed summary of research on the subject, favored retention of the manuscript style throughout the grades. Both Templin and Hildreth emphasized the continuing importance of handwriting and stressed the need for careful, systematic instruction if a changeover is made to cursive.

Harris and Herrick (1959) studied middle-grade children's judgment of handwriting. They found that the ability of children to rank handwriting scale samples in correct order appears to vary directly with intellectual level, the bright group being the most successful. The children as a group seemed to have an inadequate perception of the relative readability of handwriting scale values, although they had had several years of handwriting instruction.

Additional Reference: Kaplan (1957).

The Teaching of Spelling

There is a widespread belief that spelling abilities can be markedly improved by greater emphasis on sounding approaches. E. Horn (1957),

however, pointed out the serious limitations of this emphasis on the basis of his study of 10,000 words from his *Basic Writing Vocabulary*. The great variety of accepted pronunciations and the numerous ways in which such letters as the long *a* and long *e* sounds are spelled interfere with the use of phonics instruction in spelling. Instruction should be limited to sounds without many exceptions in common spelling.

T. Horn (1958) surveyed the evidence on numerous practical questions, such as: (a) Is test-study or study-test superior? (b) Should there be special spelling periods? (c) Are words more readily learned in context? (d) Should study of spelling be associated with study of meaning?

Rudisill (1957) studied the interrelations among phonic knowledge, reading, spelling, and mental age. She found high intercorrelations among reading, spelling, and phonic knowledge—about .70—but lower correlation between mental age and any of these factors—.52 with reading, .29 with spelling, and .42 with phonic knowledge. Kromann (1959) examined 421 fourth-grade children to determine the speech and auditory characteristics of children who showed discrepancies between reading ability and spelling ability. She found a positive relationship between auditory abilities and amount of discrepancy between reading and spelling, and recommended that auditory abilities be carefully appraised in the diagnostic procedure.

The increased use of television in education has raised questions about its value in the teaching of spelling. Phillips (1959), using 12 fourth-grade classes, reported no significant gains for the TV groups as compared with those taught by conventional methods. Lessons in proofreading yielded more favorable results in a study by Goss (1959). Employing a series of proofreading exercises with experimental groups in grade 5, he concluded that children who had had systematic teaching in proofreading made significantly greater gains in spelling than did the control groups.

Bloomer (1959), using 20 fourth-grade classes to determine the usefulness of drill in discriminating between words which have small differences, found that such drill appeared to be effective. Rea (1958) tested the relative effectiveness of three methods of teaching spelling with second-grade pupils. Three matched groups—one taught by “haptical” (presumably kinesthetic or tactual) training, another by visual imagery, and the third by oral-aural methods—were compared. There was a significant difference in favor of the oral-aural method with respect to transfer of learning. In general spelling ability, however, the three methods brought approximately equal growth.

Additional References: Chase (1958); Holmes (1959); Hopkins (1957); McSweeney (1959).

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CHAPTER VI

Literature in the Secondary School

G. ROBERT CARLSEN

IN SETTING up objectives for literary study, educational theorists swing between two poles: (a) to study techniques of literature and the facts surrounding its production and (b) to produce through literature a series of controlled responses in students that will culminate in basic concepts about human living, relationships, and understandings of the role of man. The central problem of whether literature has educational value in either frame of reference still is without substantiation from research studies.

Status Studies

Jewett (1959) studied patterns of instruction in literature in the junior and senior high schools as they were presented in 285 courses of study and compared them with a comparable study made by Smith in 1932. Use of the thematic unit of organization has increased tremendously in the junior high school. In grade 7, units centered in teen-age interests in animals, adventure, and the like; in grade 8, in American life and history; and in grade 9, in personal problems and social development. There was indication of growing use of thematic units at the senior-high-school level. The study of American literature in grade 11 was the most nearly standard course. Twelfth-grade courses showed as wide diversity as eleventh-grade courses showed similarity; but there was a trend toward world literature, and an organization around philosophical ideas.

Moulton (1959) examined the professional writings from 1925 to 1955 on the teaching of literature. She classified treatments of the subject in two categories: (a) as a humanistic discipline and (b) as training for citizenship. The recommendations strongly favored the second point of view. Of the 161 descriptions of classroom practice examined, only eight were reports of controlled experiments. Controlled experimentation is needed to determine objectively the real outcomes of varying emphases in the teaching of literature.

Stensland (1958) reviewed articles and professional materials, printed since 1950, on the teaching of poetry. The objectives of teaching poetry most often mentioned were to increase vicarious experience, to provide enjoyment, and to give moral training. In spite of these stated objectives, the methods most usually recommended were the study of historical and literary backgrounds, the study of versification, the discussion of the experience or theme of a poem, and the study of meaning through such processes as defining words, unraveling figures of speech, and explaining

allusions. Stensland's review highlighted the incongruity between the objectives sought and the methods used.

Hand (1959a) attempted to ascertain practices and beliefs of teachers in Michigan high schools in connection with the use of modern novels. Teachers reported more frequent use of contemporary fiction for outside reading than for classroom instruction. One-fifth believed that unfavorable attitudes toward the use of contemporary novels existed in their communities or schools.

Squire (1960) reviewed the research on the nature and extent of readership. He concluded that good literature has become increasingly available and is being purchased in larger quantities than ever before. Though readers generally comprise but a small segment of the adult population, there has been steady increase in the amount of reading done by young people.

Developmental Patterns

Under a grant of money, scholars from four organizations—the American Studies Association, the College English Association, the Modern Language Association, and the National Council of Teachers of English (American Studies Association and others, 1959)—prepared a statement of issues in English teaching. In literature, they asked: Should certain authors, if not specific works, be required at each level, or should the study of particular genres or literary types be established for each level? When is it most appropriate to practice rigorous textual analysis? To employ the historical and sociological approach? To relate the work to the history of ideas? How and when should a student acquire a vocabulary of technical terms and knowledge of critical concepts about literature? How is the student to acquire the requisite background about mythology, historical events, and Biblical allusions for understanding literature? Running through the questions of this group were two implications: (a) that literature is a humanistic discipline to which children are to be subjected and (b) that there is a developmental pattern in literary appreciation.

Two studies attempted to define steps in appreciation. A committee of the Oakland Public Schools (1960) defined sequential stages in poetry appreciation: Level I: enjoyment of rhythm, melody, and story; Level II: appreciation of seeing one's own experiences mirrored in poetry; Level III: projection into a world other than that in which one lives; Level IV: understanding of symbolism and hidden meanings; and Level V: sensitivity to patterns of writing and to literary style. Early (1960) defined stages of growth in literary appreciation as (a) unconscious delight, (b) self-conscious appreciation, and (c) conscious delight. She demonstrated that these follow one upon the other and suggested means by which the teacher can lead young people from one level of appreciation to another.

The Effects of Literature

Russell (1958) pointed out that no really conclusive evidence shows that what is defined as courage in a particular book will be an image of courage to the child reading the book or will motivate courageous action in the child's life. He demonstrated that much reading matter has by itself little effect on a person's deeper layers of feeling and behavior. A book acts, if at all, in a matrix of conditions and causes. Thus discussion about the inherent values of a particular book is quite beside the point. Reactions depend upon the kinds of content in the reading materials *and* upon the background, interests, and personality patterns of the individual reader.

The overwhelming conviction, even though not demonstrable through research, that literature does leave a residue of impressions about human beings and their lives and that it does have some impact on values has led to analyses of bodies of literary material. Carlsen and Grimes (1959) analyzed the picture of Texas given in novels written for adolescents and set within the state. In most, the action took place on a ranch, in western Texas. It seemed probable that a child gaining his impression of Texas from reading such books would develop a highly stereotyped picture of the region.

Gleason (1958), examining the "talking" characters in anthologies used in Catholic schools, found them usually Caucasians, mostly upper class. Non-Catholic Christians prevailed in non-Catholic texts, whereas Catholics prevailed in the Catholic editions. Rural and urban characters were equally represented, but the rural characters more often tended to be illiterate and more often exhibited positive character traits than did the urban characters. Carpenter (1957), studying the picture of the adolescent in American fiction, pointed out that he was treated either as a confused individual simply waiting for maturity to bring him light or as the symbol of the confused characteristics of our total society. Shepard (1958) studied the treatment of characters in popular children's fiction as representatives of particular ethnic, religious, and socioeconomic groups. Smith (1958) found little in the children's literature of foreign countries that would give American young people a picture of contemporary daily life in those countries.

A major controversy went on about use in the classroom of literature that presents pictures of individuals who transgress the moral precepts of society. Calitri (1959) demonstrated that the individual adolescent lives in a world in which he personally knows both human goodness and human badness, and every mixture between. In a world of confusion, literature should serve, if not as an arbiter, at least as a medium which invites students to discuss openly the problems of human experience. As such, it cannot be selected because it presents only one narrow range of human life: the good. Hand (1959b) attempted to discriminate between the passage of text that evokes open group examination and the passage that sets up secret imaginings and longings in the child. With regard to selecting

literary materials suitable for the classroom, Cook (1957) saw books as fulfilling three functions: (a) Each selection must have some teaching value, a value that can be named even though it cannot be measured; the value may stem from experiential content or from aesthetic understandings. (b) Each selection must fit into a plan for a systematic presentation of literary or social values. (c) The selections must be made with due regard to the maturity level for which they are intended.

The Junior Novel

The junior novel has been the subject of great controversy among educators. Is it literature in the real sense of the word, or is it simply filler reading which should be discouraged in the classroom? Dunning (1959) analyzed 30 highly recommended junior novels against literary criteria such as style of writing, characterization, and theme, and against social criteria such as the adult role portrayed and the adult-adolescent relationships. He found that the books could be used for teaching how to read, judge, and enjoy fiction. They could serve students in establishing their own criteria for literary satisfaction. The literary importance of books written for adolescents was further supported by two critical examinations of the field. Burton (1959) and Hanna and McAllister (1960) discussed the variety of offerings and standards for evaluation.

Reading Skills and Literature

Pooley (1960) pointed out the merging concerns of literature and reading as children pass the beginning stages of reading. Ramsey (1957) set up experimental classes in literature in which each selection was carried through four phases: (a) an introduction to the selection, (b) interpretation, (c) work on skills needed for word analysis and vocabulary comprehension appropriate to the selection, and (d) extension of interests through supplementary reading. The experimental groups showed statistically significant gains in vocabulary, speed of reading, comprehension, and word-attack skills for all levels of students and both sexes.

A similar study with similar findings was reported from the Houston schools by Reeves (1958). For experimental classes at the junior-high-school level, effort was toward developing adequate libraries, grading and classifying library resources to provide for effective guidance, and making assignments according to the ability level of students. She found that all students gained in reading skills; however, the most able made the greatest gains. These studies indicated that reading skills can be enhanced through the study of literature without making the piece of literature simply a vehicle for reading practice. At the same time they indicated that the literature teacher must consciously teach for reading improvement.

Teaching Literature

In an attempt to develop literary appreciation, Williams (1958) used demonstrations, criticism of literary works, the listing of criteria for literary evaluation, and practice on the *Carroll Prose Appreciation Test*. Sensitivity to literary qualities was enhanced through focusing direct attention on it. The study did not attempt to discover the degree to which such apparent sensitivity remained purely on the verbal level or how much it influenced the selection of literature by the student outside the classroom. Collins (1959) studied the difference between comprehension of short stories of varying difficulty when junior-college students read them silently and comprehension when they read them aloud. He found that in every classification there was some difference in favor of the oral reading. The greatest differences occurred at the easy and difficult ends of the continuum.

Conclusions

Research in the teaching of literature during the past three years tentatively suggests (a) that literature is increasingly being considered a medium of communication, its function in the schools being to awaken young people to ideas, experiences, attitudes, and feelings—and such an emphasis seems to be prompting the adolescent to read more; (b) that often the literature presented to young people presents a limited view of human life; (c) that literary appreciation grows by developmental stages which can probably be scientifically determined; (d) that reading skills can be furthered by the teaching of literature, provided some direct attack is made.

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CHAPTER VII

Literature in the Elementary School

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RESearch in the field of children's literature during the three-year period under review was characterized more by dearth than by abundance. Articles on various aspects of children's books, authors, and classroom activities filled the journals, but few reflected well-organized research design.

The most significant studies were those which dealt with (a) attempts, based on sound research principles, to ascertain reading interests and tastes of children and (b) the influence of literary experiences on the psychological functioning of the individual. Some reported efforts at individualized reading instruction, but few based choices of materials on judgments of children. Adult judgments of literature for children seemed still to prevail in selection and utilization.

Children's Reading Interests

The most comprehensive research on children's reading interests was reported by Norvell (1958), whose study included findings based on approximately 960,000 expressions of opinion of more than 24,000 children in grades 3 to 6 in all sizes of schools in New York State. Some conclusions were based on an augmented sample using data from the same geographical area. These data, with what were gathered earlier, brought the total sample to more than 4 million expressions of opinion from 124,000 children. Twenty-five hundred teachers assisted in the study, which was in process for more than 25 years.

The aim was to devise a procedure for data collection for classroom teachers which would yield results that could be combined with other independent studies carried out by the same procedure. Further aims included devising ways to determine (a) the number of pupil reports on a given literary selection necessary to yield a dependable reading-interest score; (b) the effect of age, intelligence, and sex on interest factors; (c) the influence on children's interests of adventure, humor, and romantic love in selections; (d) the effect of quality of teaching on reading interests; and (e) change from grade to grade of children's enjoyment of literary materials. Methods of collecting, processing, and interpreting the data were explained in detail. Carefully controlled statistical procedures were employed to assure reliability of results.

The study included major conclusions regarding reading interests of children: (a) The degree of a child's maturity exerts a major influence on reading interests; as children grow older, the rate of change of interest

gradually diminishes. (b) At many points the sex of the individual plays an important role in his interest in certain selections of poetry, as well as prose. (c) Moderate acceleration of bright pupils and moderate retardation of slow pupils are favorable factors in the reading program in the classroom. (d) Authoritative sources are frequently in error with regard to what children really select and enjoy in literary materials. (e) In grades 3 to 6, Mother Goose rhymes have a wide spread of interest: a few have great attraction for children; most rate moderate or low in interest; and most of the rhymes praised for literary quality rank low in children's interest. (f) Of poets ranked high by adults as poets whom children enjoy, only Milne and Lear are among the 10 most enjoyed by children. (g) Children like vigorous, dramatic, humorous poetry about subjects they know. (h) For both boys and girls, superior students and others, interest in science materials depends on either practical application of principles or inclusion of a dramatic story. (i) With regard to the reading of comics by children in grades 4 to 11, even the unpopular strips are much more widely read than books which rank high in popularity, and some strips unpopular by adult standards are read by children as frequently as many of the more popular ones. Factors aside from interest which were seen as influential in drawing children to the comics were accessibility, drawings, and ease of reading simple words and simple ideas.

On the basis of the findings, Norvell gave suggestions for making the reading program a success in the classroom. He included a comprehensive tabulation of the data which should be helpful in the selection of materials. The most significant contribution of the work was its deflation of many old myths about the "right book for the right child at the right time" by means of painstaking and scientific research principles applied to the reading interests and attitudes of children. Because the data were gathered over a 25-year period in a limited geographical area, generalization of the conclusions to current reading trends should be made cautiously.

In spite of the evidence cited by Norvell (1958), Jefferson (1958) concluded that groups of parents estimate reading preferences of groups of children very accurately. In an almost contradictory vein, however, a further conclusion noted that parents may overestimate or underestimate children's interests in some particular selection. He also observed that parents have a keen appreciation of sex differences as a basis of children's literary choices. Much further research is needed in this particular regard. Landau (1957) observed agreement between children and experts. Eleven specialists were asked to list 25 books in order and in groups of five, from funniest to moderately funny for 11-year-old or 12-year-old children. After tabulating the ratings of 120 children, he noted: "It would appear that when the experts recommend a humorous book, children heartily concur" (p. 563).

Responses of very young children to storybooks were reported in studies by Cappa (1958) and by Amsden (1960). The spontaneous responses of over 2500 kindergarten children in California were observed by Cappa.

The most-noted spontaneous response to reading by the teacher was the desire to look at the book read. The least-noted response was block play, which would probably indicate the highest level of abstraction. There were numerous requests to have the story told or reread by the teacher. Other responses were drawing, painting, dramatic play, story told by child to other children or dolls, and clay modeling. Approximately one-third of the responses were verbalized; the others were observed as overt actions. The level of abstraction in the response could well provide kindergarten teachers with clues to readiness for academic school activities.

Amsden's investigation (1960) was designed to discover three-year-old to five-year-old children's preferences in illustrations and story subjects. Sixty boys and girls from three nursery schools were involved, with 10 girls and 10 boys in each of the age groups. Two sets of 10 illustrations with identical content were utilized to determine the amount of color, value of color, and style of drawing preferred by preschool children. Photographs were used, and line drawings were made from each photograph and painted according to the variable to be tested. The investigation led to a number of tentative conclusions: (a) Generally, young children might be inconsistent in their picture preferences, but a significant number did make consistent choices. (b) There was no significant difference in choice of pictures related to sex, socioeconomic status, research population, reading habits in the home, or alertness or activeness of the child. (c) A significant bias, which tended to increase with age, was noted for a picture placed on the right. (d) Five-year-old children tended to make more stable choices on retests than three-year-old and four-year-old. (e) Light tints were preferred to saturated colors. (f) Photographs were preferred to black-and-white line drawings. (g) Though not to a significant degree, fanciful pictures were preferred to true-to-life drawings and to modified realistic drawings. (h) Three-year-old children showed more preference for modified realism than five-year-old, who preferred true-to-life drawings. (i) Illustrations with most colors were most preferred. Black-and-white photographs were equal in preference to single-color line drawings. Similar studies are needed in the elementary school, where illustrations play an integral role in the use of books. The following step would be to determine how picture preferences relate to conveying meaning.

Such a study was reported by Bloomer (1960), who observed reactions of 336 children in grades 4, 5, and 6 to picture style and theme. He drew the following conclusions: (a) Stimulating qualities of different picture themes provide a better basis for selecting illustrational style and theme than do picture preferences. (b) Line drawings with negative-tension themes related to the subject should be utilized when pictures are intended to stimulate interest and produce realistic thought about a subject. (c) Color pictures stimulate fantasy best. (d) Further experimentation seems warranted to determine the personal and environmental factors which predispose a child's responses to pictures. Browman and Templin (1959), in an exploratory study, compared 25 stories recommended for

preschool and primary-school children in 1927-29 with 25 recommended in 1952-55. In present-day stories, realistic, everyday environment was more prominent; stories about fairies and animals who behaved like human beings were fewer; and the number of adults as main characters had increased from 19 percent to 29 percent. About one-fourth more behavior situations appeared in the 1952-55 group, but similar behavior was rewarded or punished in both periods. It was concluded that stories reflected the times when they were recommended and that both continuity and change were apparent. Greatest change in story content reflected modifications with regard to general environment and philosophy in dealing with children.

The Role of Interest and Trade Books for Children in Individualized Reading Instruction

Educators became more fully aware of what appears to be a great need to individualize reading instruction. Many studies have revealed rather interesting adventures on the part of teachers but failed to follow through with really sound analyses of their programs. One such study was reported by Millman (1958), whose sixth-grade pupils often found basic reading stories boring. When they selected from various sources, they were able to evaluate materials and to build a wider background of reading skills through interest and sharing. Her report, however, like many others in the area, lacked the statistical data of a true research project. Much valuable research data could be provided from such experiments if teachers would approach the problem scientifically.

More studies are needed like that reported by Hogenson (1960), in which a control and an experimental group, each consisting of 25 sixth-grade pupils, were set up to determine the role of interest in improving reading skills. The median IQ of the experimental group was 108, with a range from 92 to 124. For the control group, the median IQ was 109, with a range from 80 to 120. The experimental group's interests were mainly adventure stories, mysteries, and family stories. Each child read as many books as he could during the 16-week study. The experimental group made significantly greater gains in reading comprehension, reading speed, and vocabulary development. The average total reading gain for the control group was 0.4 of one year, and that of the experimental group, 0.8. A significant correlation coefficient of .70 was obtained between the number of books read by individual members of the experimental group and gains made in reading skills.

Trade books for beginning readers had attention. Condit's (1959) study at Rutgers University dealt with selection of trade books for first-grade and second-grade children with normal interests and no special problems. Sixty-one children's book editors of firms represented on the Children's Book Council were requested to submit lists of books they deemed suitable

for independent reading by beginning readers. Many other sources were searched, and, out of 759 titles gathered and reviewed on the basis of the child and his interests, vocabulary, and format, 151 were selected. The 151 selections were graded by the Spache formula for readability and were tested with 99 children. From children's choices and librarians' evaluations of titles, a bibliography was developed. Approximately 5 percent of the 151 titles were judged readable by first-graders, but, of these, 63 percent were intended for superior readers. Of the rest of the books, 71 percent were judged suitable only for superior second-grade readers. The study revealed the lack of suitable trade books for beginning readers and pointed up the need for more. A complete annotated list of the selected materials was included. This study represented one of the few in which librarians had gone to children to develop recommended bibliographies.

Extraneous Influences on the Reading Interest of Children

Television and comic strips were considered as usurpers of reading time. A serious attempt to determine the relationship between certain television-watching and reading habits of children and selected behavior traits was undertaken by Perrodin (1960). *Behavior Preference Records* and personal data sheets from 352 children in Southern elementary schools in grades 4 through 8 disclosed that more than half watched television for more than 20 hours a week. Those who watched least showed the greatest preference for non-co-operative behavior. Television watching bore little relationship to preference for leadership. Children who preferred adventure television shows (which were more popular than comedies, musicals, or Westerns) showed a greater preference for non-co-operative, nonfriendly, and nonleadership behavior. Almost half of the children had read more than 20 books during the preceding eight months of school. Those who had read fewer than 10 ranked below average on co-operation more frequently than those who had read extensively. Most of the children preferred fiction. Science readers evidenced non-co-operative behavior; those below average in friendliness preferred biography; and those below average in leadership preferred fiction and biography over science and historical material. An extreme liking for "funny" comic books was expressed by most of the children, but for those who ranked below average in co-operation, friendliness, and leadership, the "non-funny" comics were preferred. Better readers showed a greater tendency to prefer non-co-operative and nonleadership traits.

Witty and Kinsella (1958), reporting the ninth in a series of studies since 1950 designed to ascertain the amount of time children devote to television, observed: "From these and other investigations, it appears that children are reading somewhat more at the present time than before television came to their homes" (p. 455). Seventy-nine percent of the children

in the Evanston study reported that their teachers offered guidance and valuable suggestions for televiewing. Many times they were guided to the book associated with the television program. From these studies it might appear that television could well be providing a stimulus rather than a deterrent to reading.

That children are still reading comics seems certain, but the evidence cited by Slover (1959) indicates that the threat of comics to good reading habits is not so great as has been suspected. Slover found the majority of fourth-graders reading comics, but the best readers and more intelligent of them chose better reading material and left the comic-book stage.

Bibliotherapy

Significant research in the field of bibliotherapy was still scant. A fairly comprehensive review of research and literature dealing with bibliotherapy as it involved the utilization of books to aid in the solution of problems of the emotionally disturbed was presented by Darling (1957). He listed 15 references dating from 1940 through 1955.

Literature and Psychological Functioning

The most significant research on childhood literary experiences as they relate to the psychological functioning of the individual in later life was reported by Collier and Gaier (1958a, b, 1959). Earlier they (1958a) observed that "psychologists have tended to neglect the field of children's literature as an area of interest to themselves or, indeed, even to children" (p. 97). The study was one of a series planned to explore the responses of children to their favorite stories at several stages of development. Stories which college students had preferred in childhood were evaluated in retrospect. Women chose stories stemming from the Oedipal period in which evil-mother figures, benign but active males, and persecuted, passive young women were involved. Men preferred stories encountered independently during the latency period with themes of adventure, problem solving, and self-assertion. For the male, story endings were reality oriented, and women figures were rare but kind and maternal when they did appear. Collier and Gaier's conclusion was that the type of story preferred and manner of reporting reflected cultural and biological sex-role expectations.

Collier and Gaier (1958b) disclosed that college women chose as their favorite stories fairy tales which were most frequently encountered at or before the age of six years, again with the story elements noted above. Among college men Collier and Gaier (1959) found a childhood preference for fictional, fairy, animal, religious, and biographical stories (in that order). Except for animal stories, the leading character in all stories was a human male, usually adult, and often solitary. They pointed out that the findings were consistent with Benedict's notion that popular stories reflect

cultural role expectations. At least three conscious wishes were seen as being shared by the subjects and as being vicariously satisfied in the stories: (a) to be conspicuously adequate, (b) to be unmistakably male, and (c) to be older than their chronological age.

A further study to test the belief that popular stories reflect cultural role expectations was reported by Gaier and Collier (1960). It was hypothesized that story preferences reflect differences in respective cultural contexts, as well as sex differences. Preferences of fourth-grade and fifth-grade American school children in New Jersey were compared with those of Finnish elementary-school children in Helsinki. Several findings emerged: (a) There appeared to be no one generally popular story. (b) Fiction was preferred over fairy tales and over informational, biographical, animal, or religious material regardless of culture or sex. (c) Similarities in taste both cross-culturally and sexually bore out the psychoanalytic assumption that, during the latency stage, the child turns his attention to all kinds of learning, with particular reference to people, places, and social relationships. (d) All groups selected favorite stories from those recently encountered, the taste of peers being influential rather than that of adults. (e) Happy endings were characteristic of preferred stories. (f) After fiction, girls chose fairy tales with characteristic features seldom observed in favorite stories of boys. (g) Boys chose information after fiction.

Qualitatively and statistically, the data presented by Gaier and Collier (1960) lent strong support to Peller's (1958) belief that, during the latency stage, sex differences in reading interests have been underestimated. In a paper presented at the Panel on Latency, Midwinter Meeting of the American Psychoanalytic Association in 1956, Peller advanced the belief that "at the core of every successful children's book there is a universal daydream" (p. 60). In a discussion of the hero tales, she noted the support they give to the daydream, as the boy in latency fulfills his need to act out fantasies which center about Oedipal wishes and their derivatives. Several references were cited which showed the hero to be an orphan or semi-orphan living with parent (or parent figure) of the opposite sex. Since the hero was an orphan, the boy's Oedipal conflicts were solved with finality and without guilt. The many father figures—as in *David Copperfield* or *Treasure Island*—helped him to solve his ambivalent feelings of love and hate for the same person.

Many of the girl's heroines were also orphans who personified many virtues. Most stories preferred by girls involved secrets (about self), encounters (with males), and unconsciousness—which assisted the female in the daydream of erotic fantasy. Not all girls' books, however, support the feminine daydream. Nancy Drew is an example of a figure who supports the bisexual identification of the girl in latency.

It was pointed out that during the later years of latency both boys and girls anticipated in their daydreams their adult roles. For boys the hero of the story consistently reflected ambitious and aggressive elements which

can reach consciousness; for girls the daydream was more veiled as it centered around erotic elements. Girls partly shared boys' daydreams because of the bisexual identification.

Conclusions

Major concern of researchers during the period under review centered primarily around (a) observed reading interests of children; (b) utilization of trade books in individualized reading instruction; (c) the impact of diverting influences such as television and comics on the reading habits of youngsters; (d) the utilization of literary materials to help children gain insight into the problems of self and others; and (e) the role-function of the characters in childhood stories as it relates to sex, culture, and other variables which influence the psychological functioning of the individual.

Children's reading interests have come to be viewed by researchers more from the point of view of the reactions of children than critical judgment of adults. There is need for further research on reading interests of children at all levels.

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CHAPTER VIII

Foreign Language Instruction

MARJORIE C. JOHNSTON

FOREIGN language instruction grew rapidly in the period 1957-60. This growth was stimulated in large part by increased public awareness of the need for languages and by financial assistance made available through the National Defense Education Act of 1958. A great number of publications dealt with the nation's imperative need for a sound, defensible, and adequate program of foreign language instruction in the schools and colleges. The language-teaching profession concerned itself with (a) audio-lingual learning, especially with the aid of language-laboratory facilities; (b) longer sequences of study; (c) application of linguistic science to language teaching; (d) use of films, television, teaching machines, and other media; (e) study of major neglected languages; (f) preparation of teachers; and (g) development of new methods, materials, and tests.

A representative coverage of bibliographical references was provided for modern foreign languages by Birkmaier (1960), for classical languages by DeWitt (1960), for bilingualism by Manuel (1960), and for English as a foreign language by Ohannessian (1960). Van Eenenaam (1959, 1960) compiled the yearly annotated bibliography of methodology of the *Modern Language Journal*.

Surveys

Numerous studies continued the fact-gathering type of research which characterizes the foreign language program of the Modern Language Association. Childers' (1960) report of national statistics on foreign language offerings and enrollments in public secondary schools, fall 1958, showed gains in 41 states and the District of Columbia since the 1954 survey reported by Mildenerger (1958). The over-all gain in percentage of high-school population, grades 9 through 12, enrolled in foreign language courses was 3.2, indicating a reversal of the downward trend, continuous since 1915, in foreign language enrollments in high school. The percentage of high schools offering one or more modern foreign languages had increased from 43.6 in 1954 to 50.4 in 1958. Huebener (1959), relating the fluctuation of foreign language enrollments in New York City to the international situation and the changing school population, highlighted some current developments: introduction of Russian into the high-school curriculum, continuity of foreign language study in the junior high school, attention to the academically talented. Remer's (1960) partial listing of Russian language offerings in secondary schools as of February 1960

included 400 high schools in 35 states in contrast to nine schools in six states reported by Mott (1957).

Mehling (1959) found that the public gave the teaching of foreign languages, including Russian, high priority in the curriculum and that a majority favored an early start. The National Education Association (1960), noting the importance of foreign language study in fostering understanding of other peoples, found that 43.1 percent of the 269 responding schools offered foreign language in at least one grade of the elementary school. Although the schools sampled were probably not typical, this growth of foreign language teaching in elementary schools suggests that language is expected to supply a tool for communication with foreign cultures and to help create a framework within which another people's way of life may be examined.

Aspinwall's (1960) survey of languages in Hawaii, where six languages in addition to English are spoken by a sizable group of the population and pidgin is the *lingua franca*, showed the total enrollment in second-year high-school foreign language classes to be just half that in first-year classes, and no public school in the state offered the third year of any foreign language. Holding students through the planned sequence is a major problem in building a program of sufficient length. A committee of the 1957 Northeast Conference on the Teaching of Foreign Languages (Fulton, 1958) found, for example, that, in New York City's 54 academic high schools, 25 to 30 percent of the foreign language students continued from the second year to the third and 2 percent continued from the third year to the fourth. An analysis of responses concerning reasons for dropouts in the New York, Boston, and New Jersey areas revealed many facets of the problem, some relating to instruction and others to such factors as community attitudes and college requirements.

The Modern Language Association surveys of foreign language entrance and degree requirements (Wolfe, 1959; Plottel, 1960) showed a slight upward trend both for admission and for the B.A. degree. Of the 899 colleges granting the B.A. degree, 31.6 percent had foreign language requirements for entrance, and 85.9 percent required a foreign language for the degree. The corresponding percentages for 1957 were 28.5 and 84.8. A few institutions had strengthened existing requirements. Comparison between foreign language offerings in the high schools of a state and the corresponding requirements for admission to its colleges indicated that many states were either strong or weak in both high-school offerings and college requirements, whereas in 21 states the percentage of high schools offering foreign languages was conspicuously higher than the percentage of colleges having entrance requirements in foreign languages.

Several current developments in foreign languages, including programs sponsored by private foundations (Atkins, 1960), were studied by a seminar group at the University of Massachusetts.

Welmers (1959) and the Modern Language Association, Center for Applied Linguistics (1960) surveyed, respectively, the major languages

of Africa and the materials for teaching languages of North Africa and Southwest Asia.

Additional References: Carroll (1960); Gaudin (1960); Hall (1959); Heumann and Bernays (1959); Johnston and Seerley (1958); Miele (1958); Mustard and Tudisco (1959).

Methods and Materials of Instruction

Are well-motivated, persevering students able to achieve more by traditional methods or by using a language laboratory? Politzer (1960) sought information on the relation of student effort to achievement and the contribution of the language laboratory to student achievement by comparing 250 first-semester French students taught at Harvard without laboratory practice and 396 first-semester French students taught at Michigan with laboratory practice. At Harvard no one of the "hard workers" among the poorer students made his way into the A group, and quite a few failed in spite of their effort; at Michigan very frequent laboratory attendance enabled some students of lesser aptitude to achieve an A in the course, and no one of those who spent a large amount of time in the laboratory ended up in the D/E group. Politzer concluded that one of the most important functions of the language laboratory is to give the individual student the opportunity to make his learning effort count.

The effectiveness of electro-mechanical aids, whether or not installed in what is usually called a language laboratory, would seem to depend upon the program which the teacher supplies. Morton (1960) cited a pilot experiment at Harvard in the use of specially designed instructional materials to permit unselected beginning students to acquire aural-oral fluency in Spanish. The theory that learning is facilitated when the student proceeds through a carefully sequenced and reinforced series of small steps was applied in the construction of course materials. These consisted of hundreds of exercises in the discrimination and accurate reproduction of significant speech sounds and on grammatical elements, plus (a) drills to enable the student to respond meaningfully to model patterns using 1500 vocabulary items and (b) drills and tests for passive recognition of 1000 additional lexical items. With 83 class hours of instruction in common, the students worked at their own rate, spending from 249 to 415 practice hours outside of class. All who finished the course achieved aural-oral proficiency equal to that normally reached by students in the third and fourth years. The success of this course provided a concrete, if partial, answer to the question of how to construct programs for teaching aural-oral skills.

O'Connor and Twaddell (1960) applied comparative-linguistic analysis and classroom experience to the production of a teaching script for giving Japanese teachers of English control over the materials to be taught in the first-year English course. This experiment demonstrated (a) the enor-

mous amount of practice needed to form language habits that are truly automatic and usable and (b) the theoretical bases for the development of effective materials and methods.

A number of the newer foreign language textbooks were designed to give initial contact with the language through the ear, to develop the student's use of the language in communication in culturally authentic situations, and to provide a systematically arranged sequence of essential structural patterns with adequate drill materials based on structural contrasts between the foreign language and the learner's native language. A series of such books was produced under the direction of Rojas (1957) for Spanish-speaking students of English in elementary and secondary schools. Bolinger and others (1960) offered a pioneering co-operative effort, with accompanying audio-visual materials, for English-speaking students of Spanish at the college level. Sweet (1957) used a structural approach to Latin. A beginning French course for which cultural-visual materials furnished the basis for the linguistic content was tried successfully in a pilot program by 20 teachers in four universities and four high schools with approximately 1000 students (Borglum, 1958). Scott (1959) analyzed an experiment in preparing literature materials for foreign students of English—an experience applicable to the preparation of foreign language readers for American students.

Numbers of texts and aids for the study of major neglected languages were produced during the period covered by this review, but considerations of space do not permit discussion of them.

Additional References: Barlow (1960); Brooks (1960); Mueller and Mayer (1958); Van Syoc (1958); Wimer and Lambert (1959).

Foreign Language in the Elementary School

Should instruction in foreign language in the elementary school be restricted to selected pupils on the basis of intelligence tests? Garry and Mauriello (1960) found that the Otis Beta group intelligence test correlated so slightly (less than .12) with the achievement of fourth-grade children in French that they recommended providing the opportunity for all pupils. Later selection, if necessary, should be made, they concluded, on the basis of performance and enthusiasm for the second language. The chief purpose of their research, however, was to appraise the effectiveness of a teacher-training program in relation to the children's progress by the end of one year's instruction. The sample treated statistically consisted of 40 fourth-grade classes from nine similar suburban communities in the Boston metropolitan area. The classes were randomly assigned to one of eight categories of 2 by 2 by 2 analysis-of-variance design, the independent variables of (a) instruction, (b) practice, and (c) teacher fluency having two variations each: training of teachers by means of weekly half-hour television programs vs. no teacher training; teacher-prepared and directed

practice vs. recorded tapes of the audio portion of the children's TV programs; and moderately fluent vs. nonfluent teachers.

The effects of these variations upon achievement were measured by a group test, in which each child selected a drawing corresponding to phrases spoken in French, and by individual oral tests given to a random sample of children. Each class was treated as a single case, the mean score on a given test being the score for the class. The total fluency of the children (judged by the combined score on comprehension, pronunciation, and dialogue) was significantly higher when practice was directed by the moderately fluent teacher. Comprehension of spoken French also was better when practice was directed by the teacher, whether fluent or not, rather than by means of the tape recordings of the TV program. The televised teacher-training programs did not produce significant differences in achievement. Televised instruction alone, without regular follow-up work by the classroom teacher, yielded inadequate levels of achievement. This study left unanswered the question of how much better the total fluency would be with practice directed by a highly fluent teacher, as well as the question of how televised instruction, combined with teacher follow-up, compares with programs carried out by a language specialist. Ellison (1960), conducting a similar experiment in Illinois, tentatively stated that televised foreign language instruction is potentially a good substitute for specialist teachers until these can be trained in sufficient numbers to meet the ever-increasing need and demand.

Penfield's (1959) research, showing the readiness of the young child for language learning, had far-reaching implications for foreign language instruction in the elementary school. He concluded that the time to begin general schooling in a second language is between ages four and ten, when the child learns new languages directly without interposing the speech units of his mother tongue. By the normal growth process in the first decade of life, language is learned as a by-product of other pursuits, as a means to other ends—a phenomenon observed by Morrison (1958), who found that "stretching" Puerto Rican children in the real setting of regular classes had marked advantages for teaching them English over giving them special instruction in non-English-speaking groups.

Additional References: Foster and Williams (1960); Hanson (1959); Philippine Bureau of Public Schools (1960); STACO (1959).

Testing and Evaluation

In the course of an extensive investigation of foreign language learning aptitude, Carroll (1958) identified six factors of apparent significance: linguistic interest, associative memory, inductive language learning ability, verbal knowledge, sound-symbol association, and grammatical sensitivity. Following research with experimental tests based on these factors, Carroll and Sapon (1959) standardized an aptitude test of general high validity in measuring basic abilities essential to rapid and facile foreign language

learning from grade 9 on. Although the test was designed primarily for adult and college populations, the results of its use in high school led Carroll (1959) to believe that parts of the test measure functions which do not change greatly from adolescence to adulthood.

Gardner and Lambert (1959), who administered a battery of tests to 75 eleventh-grade Montreal high-school students of French, found that motivation was equal to linguistic aptitude in its relation to achievement ratings. This motivational factor was characterized by a willingness to be like valued members of the foreign language community. Maximum prediction of success was obtained from tests of verbal intelligence, intensity of motivation, students' purpose in studying the language, and one index of linguistic aptitude. Nida (1957-58), through observations and case studies of American missionaries learning foreign language, noted the baffling number of persons who failed despite good motivation, aptitude, and instruction. He advocated further research on psychological factors such as emotional resistance resulting from foreign background, social insecurity, or other childhood experiences affecting learning attitudes.

Additional References: Allen (1960); Ayer (1960); Creore and Hanzeli (1960); Delattre (1960); Dostal (1960); Hascall (1959); Mildenerger (1959, 1960); Stake (1959); Yakobson (1960).

Research in Progress

Within the next few months and years an extraordinary increase in research findings will result from studies sponsored or stimulated by the National Defense Education Act of 1958. A major concern of the Language Development Program, Title VI, was the initiation of research, experimentation, studies, and surveys; creation of specialized materials to improve modern foreign language instruction; and development of tests. In fiscal years 1959 and 1960, \$6.4 million was obligated for such projects. Title VII, although designating no subject field for research, allocated over \$1 million to experimentation with films, audio-visual materials, television, and related media in foreign language teaching during the first two years of the Act. Another potential source of support, to date little exploited by researchers in foreign languages, is the Cooperative Research Program of the Office of Education.

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CHAPTER IX

Mass Communication

ROBERT E. SHAFER

THE MAJOR studies in mass communication selected for review here are representative of research which has important implications for education.

Strategies in Communication Research

In a provocative article, Berelson (1959) contended that the key ideas which gave communication research its vitality 10 to 20 years ago have "withered away" and no comparable ideas have taken their place. He observed four major approaches: Lasswell's (1958) political-historical approach concerned with the identification of symbols of political power; Lazarsfeld's sample-survey approach concerned with the effect of mass media on an audience; Lewin's studies of communication patterns of small groups; and Hovland's psychological analysis of the characteristics of messages, their appeals, and ultimate effects. Six so-called minor approaches included the broad historical view of Riesman and Innis and the mathematical approach, represented by Shannon and Weaver. Berelson predicted a future for communication research in studies of standards of evaluation of the mass media, comparative studies in international communication, the economic analysis of certain communication problems, increased sociohistorical analyses of larger issues such as popular culture, and the general study of mass phenomena, including communication.

Schramm, Riesman, and Bauer (1959) projected a bright outlook for the communication researcher in the answering of such questions as: "Who will make the adequate two-person model of communication we need?" and "Who will clarify the economics of mass communication?" Riesman pointed to the necessity of continued investigation of the impact of media structures on human sensibility and perception and to the pioneer work of Innis and the derivative work of McLuhan (1960) and of Carpenter (1960). Bauer commented that early approaches, such as content analysis, survey research, small-group dynamics, and systematic psychological experimentation, which were used to study the effects of mass communication, have now revealed their advantages and limitations, and concern has shifted from the sharpening of the method to the substance of the continuing problem of effect. Early surveys assumed highly potent effects by media in a mass society and few by small informal groups. As Katz and Lazarsfeld (1955) pointed out, they were ultimately forced to accord a larger role to the effects of informal personal influence, and mass media were seen as reinforcers of these effects.

Combining survey and sociometric techniques, the study of personal communication within a generalized theory of mass phenomena continued as a major line of investigation.

Conflicting results from the field and laboratory again illustrated the difficulty of determining effects of mass communication. Hovland (1959) and others were able to demonstrate readily identifiable changes in attitude in laboratory situations, whereas survey studies indicated conclusively that direct translations of similar "effects" to field conditions were impossible. Both field and laboratory studies have demonstrated the untenability of equating the content of mass communication media with their effects on behavior, a fact which should be of extreme interest to educational researchers, particularly in regard to educational television.

Festinger (1957) pointed out that attitudinal changes often follow behavioral changes; this seems to require investigations of the extent to which communications have capitalized on existing attitudes to produce behavior which, in turn, has produced changes of attitudes. This rubric seems compatible with the phenomenalist hypothesis proposed by Klapper (1957-58) which is generally not concerned with direct cause-effect, media-to-behavior relationships, instead regarding mass communication effects as influences working amid other influences within a total field or situation. Katz (1959), in a similar but more pragmatic vein, proposed a shift in the formulation of research problems from "What do the media do to people?" to "What do people do with the media?"

In an effort to cast broader lines of inquiry for research in mass communication, McLuhan (1960) provided nine testable hypotheses aimed at discovering the subliminal effects of radio, television, film, and telephone, as media forms, on human sensibility and perception. The media were rated as to their structural impact on the human senses in terms of the amount of information filled in by the receivers. If the differential effects of media forms on human beings can be determined, such effects will ultimately have a profound impact on the organization of communication processes and educational institutions within a given society.

In summarizing the contributions of various disciplines to the study of mass communication during a 30-year period, Lasswell (1958) noted that the field of mass communication has been a meeting ground for specialists from various disciplines but has yet to emerge totally as a discipline. He predicted that, as an emerging discipline, research in mass communication will continue to be a captive of university departmentalization unless its development is shared by all those within the university community most concerned with its capacity to provide enlightenment.

Additional References: Adler (1958); Albert (1958); Breed (1958); Cartier (1960); Foshay (1960); Gerald (1958); Gerbner (1958); Greenhill (1959); Jackson (1959); J. T. Klapper (1958); McLuhan (1960); National Education Association and American Association of School Administrators, Educational Policies Commission (1958); Ross and Bastian (1958).

Status of Research Methodologies and Techniques

As information flow increases within mass culture, new conceptual and methodological models are needed to study communication effects upon the organization of a system as well as effects on individuals within that system. Some progress seems to have been made in the refinement of research procedures used to study the effect of communication on human beings. Most of the techniques for the study of mass communication continue to be drawn from survey research. Interviewing continues as a key research tool.

Tannenbaum (1957) reported the further development of survey techniques applicable to study of the structure and functioning of a communication system, with particular reference to role concepts occurring within an organizational hierarchy. Cunningham (1957) reported five papers dealing with a variety of survey techniques, from an automatic-machine procedure for Guttman scaling to improved methods for the collection of household data. Wilson (1958) summarized some technical problems in cross-cultural research in sampling, interviewing, and establishing reliability and validity by means of illustrative examples from ongoing research in India and Latin America. Williams (1959) questioned the common practice of statistically treating similarly categorized responses to mass communication media by different people as if the responses were dynamically equivalent and unmodifiable by the respondent in the light of new learning and the prediction of future consequences.

The sharpening of survey-research tools, such as the semantic differential, by Kaufman (1959) and the bringing together, as Lazarsfeld suggested, of "classic" and survey methodologies by Nafziger and White (1958) opened new doors in the conceptualization of researchable questions in mass communication. The use of both operations research and systems analysis may become more feasible in experimental design.

Research techniques developed in the study of the effects of mass communication have much to add to research methodologies now current in education. Of particular interest is the use of a classroom model projected as a social system to forecast effects of new educational media on learners and teachers, by Riley and Riley (1960). Sondel (1959) also used the communication concepts "feed forward" and "feedback" in projecting a model of the classroom as a social system.

Additional References: Gerbner (1958); Sabine (1960).

Mass Communication Effects on Children

Several key studies indicate the intensity with which the problem of media effects on children is being pursued. A comprehensive study of the interaction between children and television was done by Himmelweit, Oppenheim, and Vince (1958) with children in London, Portsmouth, Sunderland, and Bristol. They matched 927 pairs of children in age groups 10-11

and 13-14 for age, sex, social class, and intelligence. In Norwich they studied 185 pairs of similarly matched viewers before and after television came to that city. Although the study is extremely valuable for descriptive aspects and experimental design, it is important to note that, notwithstanding the large sample and rigorous controls, little was found which could be isolated under the category of television effect. No evidence was found that children were made more passive by television or that defective eyesight was more prevalent among viewers than among controls. Many children were disturbed by danger to animals they liked or to characters with whom they had identified when the danger or violence was especially realistic. Some evidence was found of an "addict" type, not common to television alone. This type of individual consumes large quantities of any available mass medium, selecting family or adventure content to satisfy emotional needs. In this respect the research substantiated experimentation by Maccoby (1951), who discovered the addict type in an earlier study.

Witty and Grothberg (1960), reporting the results of 10 yearly studies of children's television viewing in the Chicago area, found excessive viewing of television associated with lower academic achievement. Some children, however, seemed to be stimulated by televiewing to work of higher quality. Television addicts in the first four grades did not stand out markedly from their age groups and gave no special sign of psychological problems, nor were they underachievers. Witty also found that (a) televiewing has not brought about a reduction in outdoor play, hobbies, sports, and creative activities; (b) heavy viewers did not get substantially different grades from those received by light viewers; (c) relatively few pupils read less and many pupils believed they read more; (d) primary pupils appeared to show gains in vocabulary as a result of television viewing.

Schramm (1960), in a progress report on an extensive study of the child's relationship to television within the family in West Coast, Rocky Mountain, and Canadian communities, reported that, by the age of five, 80 percent of children viewed television and, by the age of six, 90 percent. Three-quarters of all fifth-graders in Schramm's San Francisco sample were viewing television on any given day. In the diaries of these fifth-graders, television filled an average of 145 minutes a day; reading filled 40; radio, 80; homework, 88; and movies (a little less than one movie a week), about 18 minutes. The free-play time, as distinguished from media time, was only slightly more than television time—182 minutes as against 145.

Schramm's preliminary results indicated that in the first 10 to 12 years of a child's life there is a strong tendency for him to pattern his mass-media behavior after that of older members of his family. As the child moves into his teens, new role concepts and peer relationships influence his behavior, and the height of conflict between these and parental influences comes in grade 7. Of particular interest was Schramm's effort to cast televiewing within the child's situational context by attempting to chart such influences on his media behavior as role concept, developmental level, social class, and family and peer-group dynamics. Of great value were Schramm's discus-

sions of the implications of his findings for school instruction, and his 10 suggestions for research in relationships between television and the life of the child, with particular respect to televising effects on learning and maturing within the family group.

Hoban's (1960) discussion of recent advances in film research involved four "criteria of confidence" used to judge available film research: (a) use of reasonable intuition about research results; (b) the demonstrated competence of the researcher as a constructively imaginative observer; (c) the relatability of the research findings to a generalized theory; and (d) replication of an investigation involving a relative, rather than an absolute, constancy of the experiment. In applying these criteria to recent film research, he cited the advances made by studying the effects of color vs. black-and-white films in factual learning. Miller (1957) hypothesized a drive-cues-response-reward theory of learning which, when applied to film research, led him to the following conclusion: "Color should be an advantage if it is one of the most relevant cues or it can be used to emphasize relevant cues; it should be a disadvantage if it distracts or complicates" (p. 72).

Despite a variety of research studies, the differential and interacting roles of pictures and language in film remained to be identified and explicated, as did the role of film in contributing to the development of higher mental processes. Although people learn from films, further research is needed on ways of controlling what is learned and increasing the efficiency of learning. Audience characteristics, such as age and formal education, are pertinent to learning from film, but the amount of learning can be increased for any audience by building mechanisms, such as redundancy and participation, into the film.

The film research of the future may well be concerned with the production, uses, and effects of film within a communication system. May and Lumsdaine (1958), in the final report of the Yale Motion Picture Project, described a series of tightly designed and highly controlled experiments concerned with learning from films. No significant differences in comprehension were found among four fifth-grade classes after viewing a crude black-and-white motion picture and after viewing a highly sophisticated black-and-white film. Again, no significant differences were found among fifth-grade and ninth-grade classes in effectiveness of a color print and a black-and-white print of the same film. Significant differences, however, were found when questions were incorporated into a film. Motivating questions produced little effect, but participating questions produced a marked effect in the amount of factual learning communicated. As to the question of whether directing attention to parts of the film *David Copperfield* decreased the learning from other parts of the film, results were inconclusive. Although little attention was given to variables such as intelligence and socioeconomic status among student samples, the Yale report has considerable value as a model for experimental design in film research.

Additional References: Barrow and Westley (1959a, b); Belson (1958a, b); Berlyne (1958); Child Study (1960); Davison (1959); Fahey (1958);

Hill (1958); Hovland and Janis (1959); Kantor (1960); McLuhan (1960); Mitnick and McGinnies (1958); Noelle-Neumann (1959).

Instructional Television

Kumata and Deutschmann (1958) reviewed the findings on instructional television through April 1958 in this journal. Although the body of research findings has substantially increased, evidence is lacking regarding the varieties of learning possible from television instruction or the actual effects of such instruction on students of various ages and types. We have established that television can communicate information to some people. Few researchers apparently see any reason to research systematically the educational effects of various types of television programming on students or to experiment with ways of integrating television with other instructional tools within a classroom. Little is known of the effects of television instruction on students of varying personality structure or cognitive style. Many school systems and universities are now equipped for television instruction, but specific effects of such instruction upon the learners, the teachers, and the total system are still to be identified.

Studies of achievement, defined mainly as the retention and recall of factual information as measured by standardized tests, are now available from many sources. Perry (1960) reported a study from the National Program for the In-School Use of Television, including 14,326 students in experimental TV classes and 13,666 students in regular or control classes. Test results clearly showed that students who received part of their instruction by television in large classes did as well as (in many cases, significantly better than) students who were taught by conventional methods in small classes. Twyford (1960), reporting on the same experiment, pointed out that television groups were significantly superior to control groups.

In an evaluation of closed-circuit television instruction in Washington County, Maryland, Brish (1960) reported that more growth in science was achieved by those who had received televised science lessons than by the control groups taught without television. In addition, 71.8 percent of the pupils preferred science instruction with television and, perhaps more importantly, 92 percent of the teachers thought that pupils learned more about science when television was utilized.

A comprehensive evaluation of closed-circuit television instruction at Pennsylvania State University was conducted by Carpenter and Greenhill (1958). Comparing retention-test scores of students taught directly and by television, the investigators reported no statistically significant differences in achievement in such widely diverse courses as general chemistry, general psychology, elementary business law, elementary meteorology, introductory sociology, and music appreciation. They noted a gradual increase in the level of expressed acceptance of TV instruction by students, who frequently indicated that TV instructors prepared their materials better than the average classroom instructor.

Other studies explored the effects of televised instruction on achievement, but research designs were often inadequate, and available evidence remained contradictory. The state of educational television was the subject of a conference at Pennsylvania State University reported by Adams, Carpenter, and Smith (1958). Criteria for assessing programs were suggested, such as (a) the enduring educational value of a program; (b) its measurable educational impact, including content gain, consequence, and production techniques in relation to learning; and (c) the place of an educational television program in the curriculums of schools and colleges.

In an exploration of possibilities for maximum utilization of television in education, Frazier and Wigren (1960) suggested that a teaching-by-television project be planned jointly by a specialist in psychology of learning, a content specialist and teacher, a production specialist, a specialist in technical television, and another in research and evaluation. Varied experimentation was encouraged with an eye to stimulating independent thinking and creative expression. Programs were to be considered opportunities for learning and research rather than completely packaged lessons and were to provide for maximum involvement by the learner. The National Education Association, Department of Audio-Visual Instruction (1958) made similar suggestions. It is unfortunate that few research projects have as yet followed these guidelines.

Sherburne (1960), observing areas of educational television where further research is needed, stated that the pictorial-verbal nature of communication should be investigated. Studies should be undertaken which will provide academic description and clarification of what television can do best, and what it cannot do. Educational television may help to deal with the crisis of rapidly expanding knowledge and increasing information flow within the society. Hoban (1958) warned that educational television may not result in either unit-cost reduction or in increased instructional effectiveness. Technology alone can only partially solve educational problems.

Additional References: Albert and Meline (1958); Barrow and Westley (1958); Carpenter (1960); Deutschmann and McNelly (1958); Educational Television and Radio Center (1958); Ellery (1959); Fund for the Advancement of Education (1959); Golter (1958); Hamill and Broderick (1960); H. L. Klapper (1958); Kumata (1958); Macomber and Siegel (1958); Seibert (1958a, b, c); Seibert and Honig (1960); Westley (1958).

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CHAPTER X

Music Education

GEORGE H. KYME

WITHIN the period covered by this review, the Music Educators National Conference celebrated its golden anniversary. The first 50 years, its leaders judiciously observed, were devoted to quantity in music education; the next 50 years, they assert, must be dedicated to quality.

The contribution of research to quality in music education is evidenced by establishment in 1960 of a Society for Research in Music Education as an integral part of the MENC. At the same time research increased in quantity. Larson's (1957) bibliography covering the years 1949 through 1956 listed 2000 new titles from 75 colleges. Garrett's (1958) text on research techniques pertinent to music education was useful.

Research in History of Music Education

Johnson (1958) made an impassioned plea for research into the history of American music as a starting place for research in music education. He noted that of the 157 doctoral dissertations in musicology recorded by 1954, only 17 had dealt with music in the Americas. In these last three years music researchers have responded. The guiding light in the search for quality seemed indeed to be the light of experience.

Since 1915, when the publishing house of G. Schirmer established *The Musical Quarterly*, the successive volumes of this distinguished American journal of music have come to constitute a reservoir of information about music in the United States. Kinscella (1958) indexed this information, making the first 43 volumes a virtual encyclopedia of American music.

In summarizing the effect of Puritanism on the decline of Colonial music, Covey (1958) quoted Hoar, the clergyman president of Harvard, replying to a nephew who had requested a fiddle, thus: "Music I had almost forgot. I suspect you seek it both too soon and too much." Hoar would not go so far as to oppose music, but neither would he send a fiddle. In his view, it would take too much time from important occupations. The letter was dated 1661.

Loessel (1959) described the nineteenth-century unorthodox notations used in the reading of music in the northern part of the United States and indicated the rationale of their use and abandonment.

The contributions of Elam Ives and those of the Mendelssohn Quintet Society, to mention but two, were historically reviewed by John (1960) and Phelps (1960). Musicology in the area of American studies, it would seem, fulfills its highest requirements when approached in a spirit of interpretative scholarship and not as a system of historical bookkeeping.

Additional References: Baxter (1960); Fowells (1959); Monsour (1960); Montague (1959); Orland (1959).

Philosophical Research in Music Education

For the present purpose, philosophy is regarded as research when its methods of inquiry are critical and objective and when the results are accepted as organized knowledge by a consensus of trained investigators. *Basic Concepts in Music Education*, the fifty-seventh yearbook of the National Society for the Study of Education (1958), prepared by a committee with Madison as chairman, was probably the most significant philosophical contribution to music education during the period covered. Section I interprets the implications of fundamental concepts in current educational theory, and Section II contrasts actual practices with these theories. Typical of the unresolved conflicts is this concept of McMurray (1958): "To realize the aims of general education in music we cannot rely upon instruction in performance skills per se, as a means to full understanding of musical content. To teach sensitivity to esthetic content, we must rely upon other educational experiences than those of performance" (p. 46-47). There was no immediate answer on the part of the practicing musicians, though Falkner (1957) had observed that people recognized as leaders in music circles (organizers of concert series, purchasers of records and music) were those who had received intensive instruction on instruments in high school.

The theory of consonance and simple proportional lengths of strings, that is, the "chord of nature," was critically examined by Cazden (1959), who concluded that, although simple number ratios may be taken as expressions of certain definite physical properties of musical tones, they may or may not serve as an explanation of musical consonance.

Tischler (1959) presented arguments against spending time on peripheral matters in the teaching of music appreciation. Recommending less time on biography, less playing of instruments, and even less writing of original music, he argued against organizing courses according to single principles—such as the historical approach or devotion to a particular style.

Lundin (1960) reviewed reinforcement theories in learning—the basis of various teaching machines now in vogue. His application, however, was to the teacher of music.

Additional Reference: Abel (1957).

Teacher Training

Rightly, research in music aimed at improving instruction should concern itself with the fountainhead of music education, the music teacher. The consensus suggests a trend toward a more liberal, broad-field education of music teachers as contrasted with the professional-performance oriented preparation revered only a decade ago.

From a 10-year follow-up study of 81 graduates of a single teacher-training institution, Turner (1959) concluded that sufficient emphasis had been placed on the preparation of teachers to perform. What he believed needed was greater attention to teaching music skills and aesthetics.

Clarke (1958) found such broader preparation in student teaching. Most of the 42 teacher-training institutions in his survey required instruction in both vocal and instrumental areas. Eighty-five percent required further student teaching in the student's teaching minor. In most institutions student teachers met music classes on the elementary, junior-high-school, and senior-high-school levels, pupils being drawn from differing economic strata and including slow and fast learners.

Formwalt deVermond (1959), in a study of the relationship of piano-training ability to the carrying on of classroom music activities, found that 70 percent of her 205 subjects had received some piano training and that 90 percent believed piano training helpful in carrying on musical activities. Using self-evaluation of over-all ability and enjoyment of singing as criteria, significant differences were found between players and non-players.

Hertz (1959) used principals' ratings of 157 first-year teachers to question the practice of allowing a free selection of majors and minors by students preparing to teach on the elementary level. The major and minor field preparation for secondary-school teachers, for example, was not satisfactory for elementary-school teachers.

A high degree of agreement among college personnel, supervisors, voice teachers, and instrumental teachers as to important guidance practices in music-teacher education was found by Genge (1959). Among recommended criteria were pre-admission testing, successful participation in music groups prior to college entrance, solo and ensemble experience, and leadership experiences.

Henderson (1959) summarized the results of a normative survey dealing with trends in the administration of music in the public schools. Overcrowding and expansion of the secondary-school curriculum brings about scheduling of credit courses in music outside regular school hours and promotion of elementary-school music programs. Henderson saw a trend toward reduction of authority of the musical director. He found pupil achievement in music in small school systems significantly related to the nature of administration, whereas in large cities no significant relationship appeared between these factors.

Additional References: Dyrud (1959); Evans (1958).

Curriculum

Results of experimentation directed toward bettering instruction have long been treated as though they were "trade secrets" by most successful music teachers. One of the evidences of maturity of the profession is the willingness to share research findings in this important area.

Johnson (1960) found significantly greater gains in vocal range, musical knowledge, and attitude toward music among experimental groups of junior-high-school boys taught in all-male classes as compared to control groups including both boys and girls. The value of separation accountable to the special needs of the boy's changing voice was not reflected in a separated group of girls.

Evidence that elementary-school music teachers may have consistently underestimated the potential of their students was given by Pepinsky (1959), who found children to be capable of understanding the music of Gluck, Handel, and Wagner. Blyler (1960) found that, contrary to the emphasis currently given to folk music in elementary texts, elementary-school children preferred composed songs to folk songs, though words were important in making choices. Dominy (1958) studied the appropriateness of textbooks for achieving the aims of music education in the elementary school, and concluded that the apparent major purpose of the several music series which she examined was the development of skill in reading vocal music in regular form. These textbooks followed the attainment standards outlined in the 1921 courses of study for music.

In an effort to identify the differences between children of average musical ability and children gifted musically as they engaged in music-reading activities, Petzold (1960) found (although his 15-minute learning sessions were not long enough for most subjects to learn to read the material) no difference for either of the two groups between subjects who had at least one year of instrumental training and subjects with no such training. Similarly, there was no difference between grades 4 and 6.

Kyme (1960), using "shape notes" as a crutch to teach the vocabulary of so-fa syllables, found some justification for this historical music-reading aid. The shape notes provided for the accurate naming of the so-fa syllables coincidental with the pitches involved, thus offering the ingredients essential for a "conditioned response."

Studying singing of adolescent boys, Swanson (1959) found that, when they were grouped according to sexual maturity, the experimental group surpassed an equated control group in gains in vocal range, in musical knowledge, and, more importantly, in attitude toward music. Swanson separated his more mature boys from the girls, but boys in his third level (O on the Davenport scale) were assigned to the same sections as girl classmates.

Hohn (1959), analyzing with a sound spectrograph the representative Italian vowel sounds as sung by six baritones and six tenors, found significant changes in format frequencies on all vowels, especially between the highest and the middle pitch. Tenor vowels were more open and bright. A jury of trained phoneticians showed considerably greater agreement on which vowel was being sung on the lower pitches than on the highest.

Weigand (1959) compared two methods of teaching general music in the junior high school, both of which were based on organization of activities and materials into broad units of instruction, and concluded that

effective teaching could take place whether or not the materials were organized into resource units. Only in two of the three experimental situations did instruction so organized produce higher test results than those of the control group. The *Gaston Test of Musicality* and the *Farnum Music Notation Test* were the instruments used in evaluation.

Cramer (1958), studying the relation of maturation to achievement in beginning instrumental music, found that success was significantly influenced by motor development, though not by physical growth. Grade 7 appeared to offer optimum maturational conditions for beginning instrumental study.

Two investigations, LaBach's (1960) on the effect of background music on reading comprehension and Kopp's (1958) on the effect of stimulating and relaxing music on children taking arithmetic tests, showed that music does not distract and that the use of background music over a long period of time may be a way to build sound aesthetic values in music.

Hare (1959) contended that a sensory response to music is basic to music appreciation and called for an awareness of a student's likes and dislikes as well as an awareness of which elements of music he responds to. Hare's study supported belief that development of musical taste and appreciation is related to musical knowledge and the aptitude to distinguish musical qualities.

Cahn (1960) observed that, whereas junior-college students are principally concerned with music which satisfies their existing levels of understanding, teachers are more concerned with music designed to raise the students' level of understanding. Both Hare and Cahn provided for progress from the familiar to the unfamiliar; however, Cahn approved the use of devices which present musical concepts by relating them to sensory experiences such as sight and shape and movement. These, Cahn found, offer an opportunity to minimize obstacles in terminology and thus deal directly with musical values.

An excellent bibliography of music-education materials which was published as a complete issue of the *Journal of Research in Music Education* was assembled by Beach and others (1959).

Additional References: Keiser (1957); Mull (1957); Warmack (1960).

Psychological Studies in Music

Little investigation was done in music aptitude testing. Wheeler (1959) devised a test comprising pitch discrimination, estimation of time value, and musical memory. He reported a correlation of .71 with the Seashore tests.

Edwin Gordon (1958) sought to determine whether scores on the Drake musical aptitude tests are affected by training and practice. Of 29 ninth-grade subjects, five of the high-scoring and five of the low-scoring were given training. The remainder were treated as a control group. Both the

control and the experimental group made statistically significant gains when retested with the musical-memory test.

An acoustical analysis by Lanier (1960) of tones produced by clarinets constructed of various materials yielded differences discernible to machines but not recognizable by the ear. A study by Mason (1960) of the intonation with which woodwind players typically play gave no support to the belief that fine ensemble players tend to play to the Pythagorean tuning. They were merely playing "out of tune."

In a quantitative study of dynamics in musical performance Erwin Gordon (1960) found that bands rated highest in music festivals play fortissimos very loudly and pianissimos consistently softly. Perhaps *appropriateness* is the explanation, for Gordon's charts showed that the band receiving the lowest rating employed the *widest* dynamic range of all the bands, though its practice was quite erratic.

Additional References: Harris (1958); Neely (1959); Sears (1960).

Needed Research

Although this chapter cites a number of doctoral dissertations, increasingly large numbers of music educators are assuming responsibility for research. Among areas still needing the attention of these researchers are (a) evaluation of contrasting methods of teaching, (b) effectiveness of the music program in developing aesthetic judgments, (c) grade placement of the several aspects of music education, and (d) factors contributing to musical achievement. These areas are in the province of the practicing music educator. He best can bring to bear the insights and designs for research.

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CHAPTER XI

Art Education

REID HASTIE and STANLEY G. WOLD

IN THIS survey of formal research related to art education, selected studies are grouped under three main headings which emphasize recent directions: Theoretical Foundations, Teaching and Learning in Art, and Measurement and Prediction. The key studies reported in each section are examined from the standpoint of sampling, design, treatment of data, and logical derivation of conclusions.

Theoretical Foundations

Using the results from 15 paper-and-pencil tests and 3 performance tasks given to 50 students in art education and art, Brittain and Beittel (1960) reported analyses of levels of creative performances in the visual arts. Products were rated for quality of expression. Intensive examination of the products within each of three categories (high, middle, and low performance) identified art characteristics typical of each level. Inferences were made about motivations and mental processes differentiating among individuals at the different levels. Although certain speculations reveal the bias of the investigators' position, the study involved important objectives and employed a high standard of investigative procedure.

An exploratory study by Hammer (1960) of the personalities of artistically gifted high-school students suggested a method by which the complex pattern in the creative expression of adolescents and the personality make-up of the artist can be studied. A battery of projective measures was administered to 18 adolescent painters. Independently of this, each student was put into one of three categories: (a) merely facile, (b) in between, and (c) truly creative, on the basis of his performance during a workshop. The two extreme groups ($N=5$) were compared for differentiating personality characteristics. The analysis of test data disclosed a high degree of similarity in personality patterns *within* groups and striking differences *between* the two extreme groups. The small size of the samples made definite conclusions unwarranted.

Hudson's (1960) cross-cultural study of the perception of pictorial space among various groups in the Union of South Africa served as a strong reminder that social influences on aesthetic phenomena should not be ignored in American research. The study led Hudson to conclude that formal schooling and informal training combined to establish an exposure threshold necessary for the development of ability to perceive pictorial space by means of conventional cues.

Comalli (1960) studied perception of real and apparent motion. He concluded that pictured objects having directional dynamics more potently

affected the perception of both autokinetic and real motion among the artists than among the scientists studied.

Additional References: Barry (1957); Burns (1959); Eiduson (1958); Guilford and Smith (1959); Honkavaara (1958); Knapp, Brimmer, and White (1959); Kollmeyer (1958); Lewis (1959); Montgomery (1959); Riffenburgh (1959); Robinault (1958); Scholtz (1958); Tatton (1959); Torrance and others (1959-60); Wall (1959); Wallach and Gahm (1960).

Teaching and Learning in Art

Art education has set as one of its major goals the promotion of creativeness. In testing the appropriateness of this goal, Mainz (1960) attempted to determine the effect of instruction on attributes of creativity. Groups composed of persons majoring in elementary education were given a battery of nine tests before and after completion of regular college classes in art education ($N=77$) and industrial arts ($N=90$). A method of teaching which had as its major goal the promotion of creativity effected a measurable increase in the student's general creativeness. In each case the group taking a one-semester course in art education showed significantly greater gains in general creativity measures and on the test for aesthetic appreciation than those in the industrial-arts course, who dropped below pre-test achievement on part of the test battery. More sophisticated investigative procedures should be applied to other groups and disciplines: for example, Hoyt and others (1952) and Dougherty (1959).

Detailed examples of good teaching of art in the elementary schools were analyzed by Barkan (1960) to identify the underlying theory. After careful screening, 18 outstanding teachers from nine school districts were selected. Tape recordings of classroom proceedings and photographs were subjected to analysis to determine how each teacher internalized theory of good teaching of art into his personality and hence into classroom behavior. This is an important pilot study from which other investigations can proceed.

Wilding (1960) investigated art education in high school as it affects the home and family living. Forty art teachers were selected at random in Los Angeles County. By means of questionnaires, the teachers were divided into high and low groups according to the extent of orientation of teaching toward the home and family living. One hundred students of teachers in each group were randomly selected and given a questionnaire. Wilding stated that (a) very little of the secondary-school art program was oriented toward the home and family living, (b) those art courses oriented toward the home and living in a family had greater effect on the home situation than other art courses, and (c) greater improvement tended to take place in the appearance of the home and in family relationships as a result of increased art activity in the home.

Mitchell (1959) studied the relationship between attitudes about art experience as expressed by college students who were majoring in elemen-

tary education and their behavior in art activity as indicated by a series of their art works. Analyses of the data showed no significant relationship between what a student said and how he performed in art activities. Although Mitchell concluded that teachers cannot predict how students will perform in art activities on the basis of verbal understandings they appear to demonstrate, more studies are needed to verify these findings.

The usual investigation of children's color choices was carried a step further by Schwartz (1960), who studied the effects of conditioning upon those choices. Through conditioning, significant differences were produced in color preference in selection situations and in object drawings among groups randomly selected from 69 children in grade 2. The conditioning had some slight effect on use of color in art expression and no effect on quality of pictorial expression. It was concluded that preferences for colors are probably acquired responses based on emotional experience and can be modified.

A program of research directed by Wiggin (1959) attempted to develop an instrument that would predict the degree of acceptance by mentally retarded students for any new art activity. A list of art activities rated most successful in special class situations was compiled. These activities were examined to determine their common characteristics. A "yardstick" was developed to differentiate among art activities in terms of relative value for mentally retarded children and to give a predictive rating for future selections of art experiences for a special class curriculum. Further study of this yardstick is merited.

Additional References: Andrus (1958); Burkhart (1959); Freundlich (1960); Kruk (1959); Lansing (1959); Lienard (1959); McFee (1959); Micheal (1959).

Measurement and Prediction

Studying the problem of specific assessment of art aptitude and ability, Gutekunst (1959) conducted a comprehensive study of the predictive validity of nine standardized tests in two groups of college students majoring in art education at one institution. The first group consisted of 80 students stratified by class level and as high or low achievers in art; the second group consisted of 73 freshmen. The criterion was average achievement in a variety of activities in typical college art courses. In the second group, scores on the well-known *Meier Art Judgement Test* and *Graves Design Judgment Test* were not significantly related to criterion scores. However, the *Knauber Art Ability Test*, sometimes regarded as outmoded, showed a significant correlation (.47) with art achievement. The *Kohs Block Design Test* and the *Survey of Object Visualization* correlated .56 and .48, respectively, with the criterion. Their efficacy points out the importance of spatial-relations abilities in art. The six most effective predictors yielded a multiple correlation of .62 with art achievement. While not high, this index is promising, considering the restricted range of the population studied.

A factor-analysis study of the scores of 100 university students on 16 tests of spatial-relations abilities was made by Hall (1960). Important among the six factors extracted were the abilities to distinguish outlines of like and unlike forms when one form was rotated or reflected and to distinguish between like and unlike forms when interior parts were differently oriented spatially.

Wold (1960) studied the predictive validity of the *Graves Design Judgment Test* in a sample of 128 college elementary-education students. Two performance and two judgment criterion measures were developed to reveal specific aspects of the functioning of the Graves test. One performance and one judgment criterion emphasized sensitivity to art structure, as the Graves test is purported to do. The remaining two criteria emphasized qualities of personal expression. The Graves test correlated .18 (significant at .05) with the judgment measure stressing art structure and the personal-expression production task. Other correlations of test and criteria were not significant. The relationship with the judgment measure was associated with amount of previous art experience and academic aptitude. Wold concluded that the *Graves Design Judgment Test* has too slight validity in predicting performance in varied art tasks to be recommended as a measure of general art aptitude. In the same report, evidence was presented to support the conclusion that different art tasks require substantially different abilities.

A scoring key on the *Strong Vocational Interest Blank* for male elementary and secondary art teachers was developed by Croftchik (1959). The key was designed on the basis of data from 335 art teachers in Illinois, Michigan, and Missouri and was cross-validated on an independent sample of 93 art teachers. Croftchik found that the key provided definite differentiation.

Additional References: Holland (1959); Smith (1960); Waggoner (1959).

Summary

There has been a most promising effort on the part of art educators to use appropriate research tools and stringent research design in carrying out their investigations. Factors to be studied have been more clearly defined, through both empirical and rational means, and new techniques have been applied to their analysis. Renewed efforts have been made to refine methods of measuring the qualitative aspect of the art product or art experience.

The literature reveals increased interest in the personality of "the creator" and in art products as a means of studying personality characteristics in general. This utilization of visual materials, including both the works of mature artists and the graphic expressions of children, has brought both specialists in art education and psychologists face to face with important problems.

In the assessment of the attributes of art ability, the most striking development has been the assignment of added value to spatial-relations abilities for success in art.

Research in art education, in general, has shown more concern with art as a process. The many studies of creativity and those dealing with the thoughts, attitudes, and behavior of subjects in art situations are evidence of this. The accent has been on art as a personal experience rather than on art as a social activity; not art and society, but art and the individual.

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The Natural Sciences and Mathematics

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FOREWORD

The review period for this issue covers a time of unprecedented change and activity in the fields of the natural sciences and mathematics. It was for this reason that the issue was moved to an earlier open position in the cycle than it was originally scheduled for, and the review period is a little less than four years rather than the usual six for most subject-matter issues.

The chapters give evidence of major efforts by professional societies, by institutions of higher learning, and by an impressive array of national committees to influence science and mathematics curriculums. Although the changes in science and mathematics, both actual and proposed, are of major proportions, this fact has not produced any pronounced shifts in the nature or amount of the related educational research produced. In fact, one is impressed by the sparsity of the evidence adduced which would either affirm or deny the efficacy of many of the large experimental programs. There is obviously a need for a more thoroughgoing consideration of evaluative techniques and procedures and for the planning of comprehensive educational research efforts as part of these experimental programs which commit vast sums of money and the time of millions of pupils.

The amount of text required to selectively but adequately describe the research and curricular programs published during the review period make it necessary to omit the "additional references" submitted by most of the authors.

The co-chairmen wish to express their deep appreciation to contributors and to all others who helped to make this sixth review of research in science and mathematics possible.

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CHAPTER I

Science in the Elementary Grades

GEORGE G. MALLINSON and JACQUELINE V. MALLINSON

WITHIN the last few years, more attention has been focused at all levels on programs of science and mathematics than in any other period of educational history. Yet, while there have been vast expenditures of time, money, and effort designed to improve science programs at the secondary and college levels, far less attention has been given elementary science. However, there is an increasing awareness of the need for "building science programs from the bottom." This awareness is reflected in some of the studies cited herein.

Although the quantity of research dealing with elementary-school science still leaves much to be desired, there is some evidence that its quality has improved within recent years. More studies now deal with the "how" of instruction and methods for improving instruction, whereas earlier studies were largely surveys. This review is concerned with the most significant of the recent studies in elementary science.

History of Elementary Science

Of the many articles which dealt with the history of elementary science, only Kuslan's (1959a), which attempts to determine the status of elementary science in the schools of Connecticut during the period 1850-1900, merits the name of research. Unfortunately, neither the published report nor the unpublished summary reveals the source of the data, but conditions of a century ago paralleled those disclosed by findings of current studies. "In the latter half of the 19th century, there was an ever-mounting pressure on the common schools to teach science, but the lack of adequately trained teachers, equipment, and suitable textbooks effectively nullified these pressures" (p. 287). It is obvious that this statement applies to elementary science in the mid-twentieth century, also.

According to Kuslan, when the State Normal School at New Britain was opened in 1850, little science was taught in elementary schools. The science taught in the normal schools was frequently titled "Familiar Science" or "Science of Common Things," a forerunner of today's General Science. Later in the century, in the early '80's, elementary science grew through the efforts of such men as Arthur Boothby Morrill and Charles D. Hine. These men who formulated this early philosophy of elementary-school science worked indefatigably through the last years of the nineteenth century to make elementary-school science a vital part of the curriculum. This effort apparently "set the pace" for the Connecticut

normal schools, for from this time forward, "All normal school graduates were expected to teach elementary science."

One difficulty faced by elementary teachers a century ago is still a problem. Shortage of equipment is described thus: "The normal schools attempted to solve this problem by means of a superficial remedy, superficial because it was aimed at eliminating a symptom, rather than curing the disease. . . . Their solution took the form of a new course in which all students constructed simple science equipment which then became the property of the future teacher, and was to be kept for use in later teaching" (p. 288). Several entrepreneurs interested in elementary science instruction made "science kits" for distribution to teachers in the elementary schools, also.

The Elementary Science Curriculum

Most of the studies published during the period covered by this review dealt with elementary science curriculums. Many, such as Challand (1958), Kuslan (1959b), and Bruns and Frazier (1957), assessed the scope and sequence of programs. Challand appraised instruction in Illinois by distributing questionnaires or checklists to determine how teachers selected areas of elementary science to teach. She found little co-operative planning among teachers and students in determining content, and the scope of a program seemed dictated primarily by the textbook used. In many cases, instruction in science is incidental to that in other areas, and in many schools is integrated with other areas. Challand found also that elementary science is taught as a series of "atomistic packages" rather than as a cohesive discipline.

Another aspect of the study dealt with the desirable time allotment for elementary science. School administrators and curriculum co-ordinators consider 2.7 hours a week "desirable." Teachers reported, however, that they devoted 1.9 hours in the primary grades and 2.4 hours in the upper grades to science instruction.

Bruns and Frazier (1957) similarly surveyed practices in 21 major cities of the United States (including Baltimore, Chicago, Cincinnati, Tulsa, and Oakland, California) as indicated in teachers' manuals, syllabuses, and study guides. They found no well-defined patterns of scope and sequence in elementary science teaching. About half the cities had a "spiral" approach which taught certain basic areas of science at an early level and repeated instruction in those areas every two or three years thereafter, presenting increasingly difficult concepts.

In some schools the "spiral" was organized on a K-2, 3-4, 5-6 plan; in others, on a K-3, 4-6 plan. In the analysis of study guides and course outlines no consistent pattern was found in the grade placement of science topics. Bruns and Frazier saw many cogent questions yet to be answered about the teaching of elementary science.

Kuslan's (1959b) study was designed to elicit information for the purpose of bettering the training of prospective elementary-school teachers. He surveyed the science programs in four schools utilized by New Haven State Teachers College in training prospective elementary teachers. He sought information as to (a) the kind of science taught in the training schools, (b) the science backgrounds of the teachers in the training schools, (c) the factors aiding or hindering instruction in the science program in the training schools, and (d) the strengths and weaknesses in science of the student teachers. The method employed was a questionnaire validated previously by a jury of experts.

An analysis of a 75-percent return revealed these findings: (a) In general, science is not taught as a separate subject, although definite science activities are included in the elementary program. These activities are usually spontaneous and based on student interest. (b) Teachers claimed more science background than they actually had. This finding was revealed by comparing the background professed by the teachers with their transcripts. (c) Major lacks hindering science instruction were material, audio-visual aids, books, special advisory services, and community resources. There was also difficulty in organizing field trips. (d) Plant and animal life were dealt with frequently at all grade levels, but machines and energy infrequently. (Emphasis on biological areas is supported by findings of other studies in other areas.) Teachers believed inservice programs utilizing members of the college science staff to be the most helpful method of improving elementary science instruction.

A question basic to the development of an elementary science curriculum is: What subject-matter topics should be included, and at what level(s) should they be presented? Many researchers have sought to answer this question, among them Nelson (1958, 1960), who was concerned specifically with the grade placement of concepts of light and sound. In one study (1958) she attempted to discover how children in the intermediate grades learn concepts and principles of light and sound; to determine whether socioeconomic background and IQ are related to their understandings; to determine whether differences in performance on tests are a function of sex; to determine whether performance is a function of grade level; and to answer other similar questions.

A total of 118 children in three schools, grades 4, 5, and 6, were given tests both before and after instruction in the subject-matter units. The tests included the *Otis Quick Scoring Mental Ability Test, Beta, Form A*, the *Oxendine Sound Test*, a multiple-choice word-classification test (words related to sound and light), and an object-classification test in the areas of light and sound.

Nelson did no actual classroom teaching, but in a special workshop she instructed the classroom teachers as to the implementation of the experimental design. After the teaching and testing, each child was interviewed to elicit his understanding of the concepts. Among important conclusions were the following: (a) the instruction produced an increment

in the understanding of the principles of light and sound; (b) a significant gain in achievement on the test on sound was noted, the gain being related to the grade level of the students; and (c) neither socioeconomic background nor sex was a significant factor in the observed gains.

Read (1958) reviewed research on grade placement of science topics. Such studies attempt to discover whether pupils can learn to apply vicariously, in a written test situation, some basic principles of physical science which are helpful in classifying their local present environment. The research also seeks to find out whether mental age and grade level are factors in this learning.

Read's review summarized 23 studies conducted at Boston University, all of which included pretesting, a multifaceted demonstration with oral exposition of one science principle demanding pupil concentration, and post-testing. Each involved students at two grade levels or more, and sought to determine whether the understandings of concepts by students were influenced by the maturity of the student. Read concluded that (a) intelligence is a factor in achievement; (b) grade level is important in the placement of science topics, since the upper two grades tested were consistently higher on the pretests; and (c) it is possible to teach science principles at a grade level lower than that at which they are currently taught.

Dubins (1959a), concerned with grade placement of science topics, analyzed 192 study guides and courses of study for science published 1940-52, to determine (a) the topics included, (b) the principles and the grade level at which they were presented, (c) the objectives of science instruction, (d) audio-visual aids suggested, (e) evaluative techniques recommended, (f) references listed for pupils and for teachers, and (g) the general organization of the guides. He found the same major areas of instruction appearing in most of the guides. In order of frequency, they were (a) the earth, (b) living things, (c) man's control of his surroundings, (d) energy, and (e) the heavens. Observing almost 500 other science areas listed in one or more of the guides, Dubins saw "much confusion as to what to teach" and believed that in many school systems the first essential step in building a science curriculum is neglected, namely, establishing objectives. Only 38 percent of the guides listed objectives.

Children's Learnings in Science

The prime objective of elementary science teaching is to help children acquire an understanding of, and an ability in, the topics and skills related to science. Thus, some consideration must be given to the questions: (a) How can science learning be assessed? (b) How can science learning be improved?

In an effort to develop a technique for evaluating science understandings, Young (1958) sought to determine the concepts of atomic energy

that children gained from out-of-school experience. The same eight items were submitted to 75 third-grade children by interview and to a group of sixth-grade children by questionnaires. Some were questions, such as "What are things made of?" "What are atoms?" and "What is a Geiger counter?" Others consisted of pictures to interpret. For example, students were asked to distinguish between pictures of a cumulo-nimbus cloud and the mushroom cloud of a nuclear detonation.

Responses, both oral and written, were scored: did not know, or had a misconception; had some information; had detailed information. Despite inclusion of examples, the exact nature of the rating scale is unclear. Among "significant" findings were that (a) at the third-grade level, boys scored consistently higher than girls; at the sixth-grade level, the difference was not so pronounced; (b) at least one-fourth of the eight- and nine-year-olds were ready to pursue further study of atomic energy; (c) both groups had many misconceptions about atomic energy; and (d) the impact of television, newspapers, and adult conversation on children's understanding of atomic energy was evident.

Jones (1959) attempted to measure the learnings of a group of first-grade children from a program of science experiment. The data consisted of a year's verbatim records (anecdotes) collected by a teacher from children's discussions that "resulted in experimentation." Jones concluded that (a) experimenting produced skills, concepts, and attitudes which contribute to development of desirable personal characteristics; (b) experiments contribute to the development of specific skills; and (c) experimenting helps develop an understanding of concepts of science at a more advanced level than that commonly used in first-grade textbooks.

Jones indicated obvious shortcomings of the study, namely, that a teacher could not record all comments and that "learnings" cannot be ascribed to the experimental program altogether. Obviously, some science learning takes place during ordinary classroom activity. The investigator's conclusion that further study is needed to test these hypotheses is, in the opinion of the reviewers, definitely warranted.

Apropos of Dubins' (1959a) belief that one weakness of science study guides is the failure to clarify objectives, Johnston (1961) undertook to determine how well the stated objectives of elementary-school science were achieved in a representative sampling of Minnesota schools. In addition she inquired, "What pupil, teacher, and teaching-situation factors contribute to the achievement of these objectives?"

Questionnaires were sent to 478 superintendents and to a proportionate stratified random sampling of 87 Minnesota fifth-grade teachers. Additional information was obtained from logs of science activities kept by some of the teachers, from intelligence-test scores, and from pretest and retest scores on science examinations administered to 87 fifth-grade classes.

Johnston found emphasis on science in elementary classrooms less than that given to social studies or reading, and more than that given to music

or art; the typical science class was 30 minutes long, and the average time spent on science per week was under two hours. Sixty percent of the schools had some purchased science equipment. Most of the teachers reported equal emphasis on biological and physical science, but their logs indicated a 3 to 1 ratio of biological topics to physical-science topics. Classroom activity emphasized textbook reading and discussion, and only limited use was made of experimental and laboratory activities, directed observation, and "research reading." It would appear that the objectives ordinarily accepted for elementary science are not being attained.

Among investigations as to *how* children learn science and what techniques can improve science learnings were those by Atkin (1958), Garone (1960), and Bohnhorst and Hosford (1960). Atkin's purpose was (a) to ascertain the nature of children's development in certain aspects of their abilities to formulate and suggest tests of hypotheses in science learning experiences and (b) to discover what relationship, if any, exists between the relative permissiveness of the classroom situation for problem-solving activities and the development of these abilities.

From one school system he selected "permissive" (three first-grade, four third-grade, and four sixth-grade) and "less permissive" (six first-grade, five third-grade, and three sixth-grade) classes. The relative permissiveness for problem solving was judged by the investigator, the principal, and the helping teacher. A class was qualified for the study if the judges agreed that it met the established criteria.

Classroom discussions during which attempts were made to elicit information concerning the "dynamics of children's hypothesizing" were recorded and analyzed by the investigator. The reliability of the investigator's analyses was checked by his listening to a sample of 20 percent of the original recordings three months after the initial analysis. Agreement between the two analyses was greater than 92 percent. The validity of the analyses was checked on a sample of recordings by the jury of three educators. Analyses of the jurors were no more than 4 percent at variance with the analyses of the investigator in any of the categories used.

The responses of the students were classified so as to answer two questions: (a) How do children formulate hypotheses? and (b) What types of procedures do they suggest for testing their hypotheses? Among the significant findings were that (a) children at upper levels use authority as the basis for hypotheses more frequently than children at lower levels; and (b) among the younger children, observation is used most frequently as the basis for hypotheses. A highly significant relationship between the classroom setting (permissive) and the bases for children's hypotheses was discovered. In a permissive atmosphere, children used authority as the basis for hypotheses less than did children in the less permissive atmosphere. Children in the permissive classrooms made "original" guesses more frequently.

Bohnhorst and Hosford (1960) sought to evaluate the merits of certain special procedures in teaching elementary science. Two groups of third-grade children in Atlanta, Georgia, regularly viewed television science programs once a week in the school auditorium. With the control group the classroom instruction that accompanied the television instruction was based chiefly on textbook units. With the experimental group the classroom instruction was based on questions raised by the children as a result of the TV lessons and other experiences with science. The questions were placed in a "wonder box" which was opened at certain times, the questions discussed and plans made for individuals and groups to answer them.

In order to measure gains in the achievements of both groups, the *National Achievement Elementary Science Test* was used as a pretest in October and as a post-test in May. In October there was no significant difference between the scores of the two groups. At the end of the program, the experimental group scored significantly higher than the control group. The researchers, allowing that many factors may have been responsible for the measured gain of the experimental group, imply that the "wonder box" approach was the significant factor.

Garone (1960), using techniques similar to those employed by Atkin (1958), studied 29 superior children aged 10-12 to observe their "science concept development" and gather information about their problem-solving ability. He made tape recordings and kept anecdotal records of their comments during group activities. Organizing data from recordings and records in terms of experiences and processes fundamental to children's science concept development, he concluded that appropriate problem-solving activities would improve children's concept development skills.

Under suitable conditions children will share their concepts and ideas with others, but they need guidance in separating fact from fiction. Sometimes a long period of time elapses between the original experiences and the development of concepts. Garone's vague description of techniques and findings casts doubt on the validity of his conclusions.

Improvement of Instruction in Elementary Science

Another category of studies dealt with techniques and methods that may be of value in improving instruction. Richardson (1960a, b) attempted to assess science teaching in the elementary schools of New Jersey and identify programs and activities representative of the best approaches. The appraisal was accomplished by means of a checklist of desirable practices, prepared by the investigator and validated by two juries of experts. Fifty-four typical lessons from kindergarten through grade 3 in 22 selected schools were observed, and "quality indexes" of the lessons were determined.

The indexes indicated that the quality of science instruction was low; many teachers were poorly trained in science; biological topics were

emphasized more than physical-science topics; limited use was made of activities designed to develop understanding and problem-solving abilities; and the least-used teaching tool was the experiment.

Richardson's observations led him to believe that (a) all elementary-school personnel should complete introductory laboratory-type courses in biology, chemistry, physics, and earth science, and a course in methods of elementary-school science; (b) these courses should include experiences in problem solving; (c) the teaching of elementary science should be centered around problem-solving situations, with sufficient permissiveness and freedom to provide for individual differences; (d) in the upper elementary grades science should be taught by science majors but should still emphasize problem solving and make frequent use of community resources; and (e) each classroom should have facilities for simple laboratory experiences.

Dubins (1959c), also concerned with improving elementary science instruction, devised an inquiry form and submitted it to many persons qualified to state what measures were being taken toward improvement. Responses indicated that (a) the larger the city the more likely it is to have a published course of study for and workshops in elementary science for teachers, and to employ a science consultant and science educators as special lecturers; (b) most states have colleges that conduct workshops in science for elementary teachers, although fewer than 10 percent of the states have agencies that publish materials for use by elementary teachers; (c) in many localities, science is not taught in the elementary schools; and (d) the activities of state departments of public instruction for improving elementary science are, at best, mediocre. Although Dubins' purpose was "to gather information concerning what is being done for the improvement of instruction in science in the elementary schools in the United States," his findings are more indicative of what is *not* being done.

Another study by Dubins (1959b) examined a method for rating an elementary science course. He applied five different scales to 29 courses. Values were then assigned to analogous components of the courses, and the sums of the ratings from the five scales were computed. A five-point scale was obtained by subtracting the lowest sum from the highest sum and dividing by five.

Dubins observed that to evaluate a course of study, an investigator must (a) determine factors to be considered, (b) arrange them in order of importance, (c) assign a maximum number of points to each factor, and (d) evaluate all guides on the basis of the same scale.

More research of higher quality is needed in this general category.

Teaching Aids for Elementary Science

Studying the use of television in science education, Reiner (1959) sought to determine the effectiveness of the "Science Corner" programs

in introducing and implementing the new elementary science course for kindergarten to grade 2 and grades 3-4 in New York City public schools. A total of 175 teachers from 47 schools participated.

At the close of the "Science Corner" series, the teachers were asked to indicate the degree to which each of the following outcomes was achieved: (a) stimulating pupil interest in the local environment; (b) increasing children's awareness of science; (c) making science part of a purposeful pattern in the classroom; (d) increasing the children's fund of scientific information; (e) increasing the teacher's information; and (f) using the series as a successful classroom aid.

The responses indicated that the telecast series was effective in improving these science programs. The teachers stated that (a) pupils' interest in the environment was stimulated; (b) pupils' interest in science was high during and following the telecasts; and (c) pupils' science information was increased. The programs assisted teachers in introducing the content of the new course, presented demonstrations suitable to the science classroom, and were valuable in suggesting activities for the science program.

Elementary science teachers became increasingly aware of the importance of reading level in selecting textbooks. Mallinson, Sturm, and Mallinson (1957) followed up a series of earlier studies to determine whether the reading difficulties of contemporary textbooks had been reduced. All texts published since the earlier study (mostly for high-school science and a few for the elementary level) were analyzed by the Flesch formula. In general, the recent textbooks were difficult; all but one of the elementary books had a reading level above the grade level for which they were designed. Publishers need to warn authors to pay greater attention to reading difficulty. However well organized a book may be, it is not likely to be of value if students cannot read it with sufficient ease to understand it.

In a second study, a sequel to the one just cited, Herrington and Mallinson (1958) tried to determine whether the measurements made with formulas of reading difficulty were more consistent than the estimates made by reading experts. Passages from science textbooks for grades 4 to 8 were analyzed by means of the Flesch, Lorge, and Dale-Chall formulas. The same 199 passages were sent to "reading experts" or "specialists in reading" in large cities for rating.

Measurements made with the formulas were more consistent than the estimates of the "experts." Among the experts there was not even general agreement with respect to levels of difficulty. In some cases their judgments varied by more than five grade levels. However, with 20 of the samples, measurements with the formulas indicated the same level of reading difficulty. Other comparisons of the results were always in favor of the formulas in terms of consistency. Hence, it would appear that teachers ought not to rely solely on their judgment of reading level when they examine textbooks, but rather to evaluate grade level of difficulty as

determined by a readability formula, and modify that with judgment as to content, organization, and interest level.

Teachers of Elementary Science

Emphasis on elementary science focused attention on the elementary classroom teacher. In meeting after meeting, one heard the statement that elementary teachers are reluctant to teach science. Victor (1960) undertook a study of factors which might be involved in the reluctance of elementary teachers to teach science. Possible factors hypothesized were (a) inadequate science backgrounds, (b) belief that one has to be a science expert to teach elementary science, (c) lack of familiarity with the objectives of elementary science instruction, (d) belief that "science teaching is a man's job," and (e) the "feeling of loss of classroom prestige, due to difficulty in answering questions about science."

A questionnaire designed to ascertain attitudes and opinions about these factors was submitted to teachers in grades 1 through 6 in one Illinois city. Of 116 questionnaires distributed, 106 were returned. Most respondents were experienced female teachers with less than two years of science in college, chiefly in biology. In the classroom they devoted one and three-fourths hours a week to science, and the science experiences were usually confined to three days. They reported adequate equipment, although some responses indicated infrequent use of it. Almost half the respondents reported that they used demonstrations only once a month or less often. The principal conclusion was that lack of familiarity with content and materials was a definite factor in the reluctance of elementary teachers to teach science. Loss of prestige because of inadequate knowledge was considered to be a related factor. Other factors were believed related to inadequate science background.

Piltz (1958) similarly sought "to find what, if any, relationships exist between aspirations of teachers and the difficulties they think they face" in teaching elementary science. He distributed a questionnaire to a 10-percent stratified random sample of Florida elementary teachers, interviewed a limited sampling, and made observations in certain teaching situations. A summary of the questionnaire responses revealed that in order of frequency, the areas in which problems of science teaching exist are physical facilities; methods and techniques of teaching; resources, materials, and equipment; field trips; content, subject matter, and area of experience; and library facilities. The problem of physical facilities was further verified during the interviews and observations.

Victor's and Piltz's studies indicate that teachers are concerned about their adequacies to teach science and recognize their difficulties in organizing an effective program of instruction. Some "experts" have advocated use of special teachers. A recent study of this question (Gibb and Matala,

1961) was designed to elicit answers to two questions: (a) Can science and mathematics each be more effectively taught by special science teachers than by the regular teacher? and (b) Are the effects the same for all children regardless of the ability of the child?

Four different kinds of public school systems (Cedar Rapids, Iowa; Lansing, Michigan; Versailles, Kentucky; and Washington, D.C.) were selected, and within them four fifth-grade and four sixth-grade classes with similar socioeconomic backgrounds. Two classes of each grade were taught science and mathematics by two special teachers; and the other two by the regular classroom teacher. At the beginning of the year, five tests were used to measure interest, general ability, and knowledge in social studies, science, and mathematics. The tests were again administered at the end of the year, and each teacher kept a log of daily activities related to the teaching of science and/or mathematics.

At the close of the first year, the following tentative conclusions were drawn: (a) fifth-grade science can be taught as effectively in self-contained classrooms as by special teachers; at sixth-grade level, special teachers are more effective than regular classroom teachers; (b) there was no evidence that either method was more satisfactory in rural or in urban systems; and (c) student interest fluctuated across the systems, but it was not possible to attribute these changes to the method used. Although the researchers emphasized that results of the second year may modify these conclusions, they asserted that their findings do not "support either type of organization as being superior for all school systems."

Summary

Although much past and present research in elementary science is of the survey type, more experimental and relationship studies are appearing. It is strongly recommended that researchers in elementary science devote future efforts to "how-to-do-it" studies, rather than to summaries of current practices and weaknesses. Attention should be given to *evaluating* the outcomes of elementary science programs. Within the span covered by this review, no published studies dealt with evaluation of student achievement.

Another area that needs research is what objectives of instruction are desirable and attainable. Researchers need to concentrate on identifying understandable, attainable goals and techniques by which classroom teachers can attain those goals. So far effort in this direction has resulted only in nebulous platitudes. Still another area requiring attention is that of preservice and inservice programs for teachers. Researchers could well seek to determine the optimal types of science training needed by elementary teachers and how best to provide this training. These are large orders, but they represent the areas most in need of extensive research effort.

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CHAPTER II

Mathematics in the Elementary School

HERBERT F. SPITZER and PAUL C. BURNS

THE MARKED activity in this area is indicated by the length of this review and the number of reports covered. The material is organized under five major headings: Summaries and Bibliographies, General Factors Affecting Arithmetic Learning, Teaching for Specific Goals in Arithmetic, Research on Teaching Methods, Teacher Education, and Arithmetic Teaching in the United States and in Foreign Countries.

Summaries and Bibliographies

The period covered by this review produced, in addition to Hartung's (1957, 1958, 1959, 1960) annual annotated bibliography, two new types of reports. Weaver (1957, 1958, 1959, 1960b) examined research on arithmetic instruction from 1951 to 1956 and began an annual list of such studies. Weaver (1960c) also compiled a selected list of improvement projects related to elementary-school mathematics. Hunnicutt and Iverson (1958) reviewed research in arithmetic in connection with a report on research in the "three R's," and Glennon and Hunnicutt's (1958) review covered similar material. A summary of research in remedial arithmetic was prepared by Bernstein (1959).

In an extensive bibliography for the Twenty-Fifth Yearbook of the National Council of Teachers of Mathematics, Schaaf (1960) listed outstanding contributions in 16 divisions of arithmetic teaching. Weaver (1960a) listed selected summaries and critical discussions of research in elementary mathematics.

General Factors Affecting Arithmetic Learning

Some studies of arithmetic learning are reported under the headings of closely related topics. Sister Josephina (1959) found that fifth-grade pupils forgot in three months a significant amount of what had been learned, and attributed the loss to lack of drill and meaningful first learning. Klausmeier and Feldhusen (1959) found no difference in ability to retain arithmetic learning among three groups of pupils of varying intelligence but identical age (117 months). In an attempt to determine whether

100-percent automatic response for every pupil in a class is possible. Ulrich (1957) found that pupils varied in performance of two-digit multiplication (multiplier and multiplicand) from one day to the next. Collier (1959) reported the identification through study of eight major blocks to arithmetic understanding and recommended ways for removing these blocks. In a study concerned with the teachability of some of the basic concepts that underlie multiplication and division of common and decimal fractions, Brydegaard (1960) found that sixth-grade pupils can master these concepts when procedures which make for sharpness of the concepts precede practice.

Abilities and Attitudes

On the basis of an attitude inventory, Fedon (1958) found pronounced attitudes, both for and against arithmetic, developing as early as grade 3. Some essential aspects of arithmetic were enjoyed, but enjoyment did not necessarily indicate understanding. Feldhusen and Klausmeier (1959) found counting by 3's the highest level at which 117-months children of low intelligence could perform. Counting by 23's was the similar level for those of high intelligence. Among 269 sixth-grade pupils, Erickson (1958) found correlations of .72, .73, and .58 respectively between IQ and total arithmetic, IQ and arithmetic concepts, and IQ and problem solving. A correlation of .67 between arithmetic scores and reading comprehension scores was reported.

Keough (1960) reported a positive relationship between pupils' socioeconomic conditions and arithmetic achievement. On the other hand, Alexander (1960) found no significant difference in socioeconomic status, verbal fluency, or spatial visualization between high and low achievers in grade 7. Corle (1958) observed improvement in ability to estimate measures after fifth-grade instruction. Stright (1960), using a revised form of the *Dutton Attitude Scale*, found that, in general, pupils' attitudes toward arithmetic improve during the period from grade 3 through grade 6.

Number Concepts of Children

Gunderson and Gunderson (1959), repeating a 1939 study of number ideas of seven-year-old children, found many more similarities than differences. The 1959 children had better concepts of fractions but were not as capable as the 1939 children in addition and subtraction. Seven-year-olds were found to have a wide use for number knowledge. Davis, Carper, and Crigler (1959) reported that, although there are marked differences, four- and five-year-olds have considerable understanding of common measures.

Teaching for Specific Goals in Arithmetic

Fractions

Gunderson (1958) found that second-grade children, with word-problem settings and manipulative materials, could develop and use fraction ideas. Stephens and Dutton (1960) observed the common-denominator and inversion methods to be equally effective in developing skill in fraction division. They recommended that, since the common-denominator method gives more meaning to the process, both methods be taught. Aftreth (1958) concluded that systematic practice in identifying and correcting errors in addition and subtraction of fractions has no appreciable effect on achievement.

Jones (1960) surveyed development of vulgar fractions in American arithmetic books from 1719 to 1839. Struik (1959) discussed the historical evolution of decimal fractions.

Problem Solving

Chase (1960) found few academic skills and intellectual factors necessary to problem solving, the most important being ability to compute, ability to observe detail, and knowledge of fundamental concepts. A number of secondary variables are related—such as knowledge of generalizations which underlie the number system and ability to apply reading skills to a variety of purposes. Corle (1958) saw a high relationship between accuracy in problem solving and understanding, and between problem solving and confidence in one's own accuracy. He found that computational inaccuracy accounted for only 12 percent of the errors. On the basis of pupil performance in estimating quantities, Corle believed some pupils' difficulties due to an inadequate concept of the measures involved.

Mental Arithmetic

Although mental arithmetic is frequently mentioned in the literature, only six research studies bearing on the subject were reported. Analyzing exercises in six textbooks, Flournoy (1957) noted the need for more mental-arithmetic exercises and for improving their quality. In a later study Flournoy (1959c) found that 72 percent of the uses of arithmetic of children in grades 3, 4, 5, and 6 were of the non-pencil-and-paper type. Olander and Brown (1959) observed oral presentation of subtraction to be more difficult for pupils than flash-card presentation. Sister Josephina (1960), studying two techniques of presenting mental arithmetic problems in grade 5, found pupil performance better when the problem was read from the book and then looked at than after only oral presentation by the teacher. Wandt and Brown (1957) found three-

fourths of the nonoccupational uses of mathematics among a group of 147 teachers and students to be mental, about half of these situations calling for exact computation.

Research on Teaching Methods

Methods of Instruction

Research in method continued to be characterized by studies concerned with both broad and specific aspects of instruction. The broad study is illustrated by Lankford and Pattishall (1956), who found significant differences favoring use of procedures which encouraged pupils "to think out independently the basic operations in ability to add and subtract fractions." Eads (1957) listed use of developmental levels of learning and pupil participation in planning, conducting, and evaluating learning experiences as effective principles to guide action research. Shipp and Deer (1960) observed that achievement tends to increase as the amount of time devoted to development increases.

British teachers' use of colored rods (Cuisenaire-Gattegno) in teaching arithmetic was discussed by Howard (1957). Users were convinced that the method has value; that greatest benefit accrues to the best pupils; that some concepts can be developed most easily by this means; and that the approach holds promise as a supplement to current methods. Brownell (1960), observing practices and consulting with school officials in England and Scotland on the Cuisenaire-Gattegno and Stern approaches, observed that (a) these experimental programs are not extensive in England and Wales but are more used in Scotland; (b) the color approach does not eliminate counting as a substitute for addition; and (c) the experiences of British schools with the new approaches to arithmetic teaching have important implications for U.S. schools. These implications are that (a) we have underestimated the attention span of beginners; (b) we have underrated the readiness of beginners for systematic work in arithmetic; and (c) children in the lower grades can learn much more in arithmetic than they are now asked to learn.

Burns (1960), studying specific aspects of method, found that use of thought-provoking review study questions produced superior learning and that teachers favored use of these questions. Mazzei (1959) reported that, although estimating answers produced only slight gains in achievement, the procedure led to thoughtful analysis, with resulting better understanding. Kenney and Stockton (1958) found a method combining emphasis on drill and understanding more effective in teaching percentage than emphasis on either alone. Tredway (1959) reported that emphasis in instruction of seventh-grade pupils on the relationships between the elements of percent (usually named number, percent, and part) was more effective than the usual textbook presentation.

In a test of two methods (round up and a combination of round up and round down) of estimating the quotient, Flournoy (1959a) found that some pupils, especially low achievers, did not apply both rules in a test situation. On the basis of the results, the value of teaching two rules was questioned. Flournoy (1959b) also reported the caret method of placing the decimal point in decimal division superior to the subtraction method of placing the decimal point.

Evaluation

Continuing interest in new instruments for evaluating achievement in arithmetic, especially understanding, is indicated. Rappaport (1959), reviewing the literature on tests for understanding, concluded from it and from experimentation that to devise an objective test of understanding is both essential and possible. Experimental investigation of the relationship between computational-skills tests and meanings tests led Rappaport (1958) to believe computation a poor indicator of a pupil's grasp of meanings. Sax and Ottina (1958) constructed a test of mathematical meanings for comparing the achievement of children from "progressive" and from "conventional" schools. They found that the deviation of the differences favored the "progressive" school, but not all of the findings were statistically significant.

Individual Differences and Enrichment

How to adjust instruction to the abilities of pupils continued to attract investigators, whose interest appeared to shift from low performers to high performers. From tests and observation, Lewis and Plath (1959) were led to believe separation from the group and provision for intensive study of numerical operations a promising procedure for use with highly able children. Comparing performance of 11 ability-grouped classes with that of eight classes not grouped, Provus (1960) saw bright pupils profiting most from grouping. Holinger (1958) gave a case report of an advanced first-grade child who lacked ability in arithmetic. Shepard (1958) found study of the Pythagorean theorem a possible source of enrichment for fifth-grade pupils. To enrich the program in a one-year experiment, Townsend (1960) recommended use of advanced materials with pupils of superior ability.

The Casis School Faculty (1959) in Austin, Texas, exploring ways of meeting individual differences in arithmetic, reported no specific findings but summarized the techniques which seemed useful. Durrell (1959), trying to adapt instruction to individual differences, grouped pupils within classrooms for arithmetic instruction and fitted textbooks and materials to ability. Achievement improved significantly in grades 5 and 6; the improvement was greater in problem solving than in computation.

Grade 4 showed no improvement. Studying programs and records of schools chosen from the Educational Records Bureau Independent Schools list, Erhart (1960) observed much administrative effort being put into attempts to supply an arithmetic program suited to the academically talented. He saw more arithmetic material being offered to the talented and at an earlier age than to average pupils.

Materials of Instruction

Studies involving materials of instruction covered a wide range. Folsom (1960), from a study of the manuals accompanying arithmetic books, reported that teachers like suggested prebook instructional exercises. She recommended that texts and manuals be planned simultaneously, in contrast to present practice for fitting the manual to the text. Durr (1958) found workbooks helpful to learning. Studying the application of research findings to textbook production, Dooley (1960) concluded that recommendations in yearbooks of the National Society for the Study of Education and the National Council of Teachers of Mathematics were applied quickly.

Anderson (1957) found no significant effect on eighth-grade pupils' learning from use of visual-tactual devices in a unit on areas, volumes, and the Pythagorean relationships.

Jarolimek and Foster (1959), judging from fifth-grade pupils' performance involving quantitative concepts, found three widely used social studies books varying in difficulty. Repp (1960) observed considerable variation in the vocabulary levels of five third-grade arithmetic texts.

Stokes (1958) listed problems involving arithmetic that children encounter and their ways of solving them. He recommended that materials evolved from the problems indicated by 72,000 children be made the basis of the arithmetic curriculum for grades 1 through 8.

Television, Machine, and Film Teaching

Use of television, teaching machines, and films for teaching elementary mathematics was the subject of several investigations. Jacobs and Bollenbacher (1960) compared the achievement of three groups of seventh-grade pupils: (a) those partially taught by television, (b) those taught by the same teacher using conventional methods, and (c) those taught by a different teacher using conventional methods. With high-ability pupils, conventional teaching was superior; with average-ability pupils, television teaching was superior; with low-ability pupils, the difference in result between television and conventional teaching was negligible.

Using a multiple-choice method for automated teaching of areas of rectangles, Keislar (1959) found performance of the automated-teaching

group superior to that of a matched group which received no planned instruction.

Teacher Education

The great interest in elementary mathematics teaching has not produced corresponding interest in research in teacher preparation. Undoubtedly, more research in teacher training, influenced by the new emphasis on arithmetic, will soon appear. As background, the review of research in college mathematics and teacher education by Meserve and Schumaker (1957) should be helpful.

Observing the vocabularies of elementary mathematics terms of prospective teachers and the low relationship of this vocabulary knowledge to arithmetic achievement scores, Phillips (1960) contended that a testing program for elementary-school teachers should extend beyond a test of elementary arithmetic achievement. Arithmetic achievement alone would not guarantee knowledge of vocabulary.

Testing 450 experienced teachers led Bean (1959) to believe that teacher understanding of arithmetic increases with experience for 11 to 15 years. Waggoner (1958) found that prospective teachers made significant gains in mathematical competency in a course designed to aid students to understand the nature of arithmetic. Fulkerson (1960) found that prospective teachers' competence in arithmetic increased with years of preparation in high-school and college mathematics. Standlee and Popham (1958) reported that more than 75 percent of the elementary-school teachers in Indiana (93 percent of those graduating from large public institutions) have fewer than 10 hours of college mathematics credit.

From a questionnaire, Stipanowich (1957) found outstanding educators advocating two years of high-school mathematics as a requirement for admission to an elementary-teacher-training program; they also favored a proficiency test before enrollment in the required mathematics background courses and urged that subject-matter and methods courses be separate.

Barnes, Cruickshank, and Foster (1960) found 70 percent of "superior" fourth-grade teachers of arithmetic (principals' rating) without college credit in mathematics; 24 percent had one to six units of college mathematics. Corresponding percentages for "fair" teachers were 77 and 23 percent. Teachers rated "superior" by administrators tended to underrate their own ability; teachers rated "fair" tended to overrate their ability. Superior teachers had a positive attitude toward their high-school mathematics, and a large proportion of fair teachers reported a negative attitude.

The Committee on the Undergraduate Program in Mathematics (1960), under the chairmanship of Buck, recommended that two years of college

preparatory mathematics be a prerequisite to the program for training elementary-school teachers.

Arithmetic Teaching in the United States and in Foreign Countries

As indicated by the number of studies, comparison of arithmetic teaching in the United States and in foreign countries was a popular area of research. Buswell (1958), using an adapted form of a test from England, reported that English pupils made significantly higher scores than California pupils of the same chronological age. With the same materials and approximately the same conditions as those of the Buswell study, Bogut (1959) obtained in St. Paul, Minnesota, a mean score of 19.6. The mean for the comparable English school pupils was 29.6; for the comparable pupils in the Buswell study, 12.5. The relative differences of the means on the computational part (St. Paul 6.5, England 14.3, and California 4.3) and the problems part (13.1, 15.3, and 8.2) of the test are, according to Bogut, a reflection of the meaningful approach in teaching used in American schools.

Comparing arithmetic achievement of Iowa pupils and Dutch pupils, Kramer (1959), using a modified form (to fit the Netherlands conditions) of the *Iowa Basic Skills Test*, found significantly higher means for the Netherlands pupils, but indicated factors which make simple comparisons of means questionable. Dutch pupils complete their arithmetic study in six years, devoting 27 percent more time to the subject than Iowa pupils give to it in eight years. Forty percent of sixth-grade pupils in the Netherlands have repeated at least one grade; only 10 percent of Iowa eighth-grade pupils have repeated a grade. The top 10 percent of pupils finishing the study of arithmetic in Iowa achieve at the same level as those in the Netherlands, the Iowa pupils being two years older and the Netherlands pupils having spent 27 percent more time on study of the subject.

Kreisner (1958) observed performance of Glen Rock, New Jersey, fourth-grade to eighth-grade pupils to be higher on an Ontario arithmetic operations test than the performance of pupils in Ontario.

Using the same British test that Buswell used, Tracy (1959) reported, for white eighth-grade North Carolina pupils at the same stage (near completion) of arithmetic study as their British counterparts, a mean of 30.9, as against a British sixth-grade mean of 29.6 and the mean of 12.5 reported by Buswell.

Miller (1960) found less time being devoted to arithmetic in the United States than elsewhere. De Francis (1959) observed the content of Russian first-grade texts to be far more extensive than that of comparable American books, but failed to report that the Russian books are for eight-year-olds. The Russian books contain many work problems. In

another comparative study of textbooks, Schutter and Spreckelmeyer (1959) found the mathematical content of U.S. textbooks (especially in the lower grades) less than that of European.

Some of the difficulties in making comparisons can be deduced. If, for example, achievement of pupils is to be the criterion on which schools are compared, then time spent in study, it seems, should be considered. As pointed out by Kramer (1959) and Tracy (1959), European schools finish arithmetic study in six years; U.S. schools allot eight years. Comparison of the achievement of sixth-grade pupils in Europe with sixth-grade pupils in the United States is then not very meaningful. The same is true of a comparison of texts.

Chetverukhin (1959) reported the time allotted to arithmetic in the Soviet elementary grades (1-4) and intermediate grades (5-8) as 360 minutes a week. Beginning in grade 5, elementary mathematics is taught by special teachers. In 34 large U.S. school systems, Miller (1958) found the median daily arithmetic time varying from 23 minutes in grade 1 to 45 minutes in grade 6. In smaller cities the corresponding time varied from 30 to 47 minutes.

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CHAPTER III

Science in the Secondary School

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SECONDARY-SCHOOL science education has, in the past few years, received support to an extent heretofore unknown. New courses are being developed under ever more desirable circumstances. At the same time science-education research at the high-school level continues to be fragmentary and limited in scope. The review which follows is restricted to investigations considered sound in design and analysis which had both breadth of interest and more than local applicability.

The Status of Science Instruction

Three studies of the status of science instruction, national in scope, provided a description of science teaching, the teaching facilities available, and the requirements and recommendations of state departments of education. The National Education Association Research Division (1958) provided figures, more meaningful than those provided in earlier studies, which showed that of 1,250,000 high-school graduates in 1957, about 175,000 had taken four years of science and 480,000 had completed three years. More than half the schools were engaged in science curriculum review and revision before the first Russian satellite was successfully orbited. Less curriculum revision was being undertaken in the junior high schools than in senior high schools. The study concluded with the statement that secondary schools were doing a more comprehensive job in science instruction provisions and improvements than has been assumed in current discussions.

Obourn and others (1960) obtained data on the facilities and equipment related to science teaching. The questionnaire study involved a survey of the entire nation. Such factors as geographic location, size of school enrollment, and type of school were taken into consideration in presenting the data.

Martin (1960) collected state department of education requirements and recommendations pertaining to facilities and equipment for science and mathematics teaching. The report included specific recommendations for each of the states, with plans and drawings of facilities in many instances. The findings for elementary and secondary schools were summarized into tables for easy comparison.

Studies at the Junior-High-School Level

Curriculum

The junior high school has as yet seen no major programs of curriculum building comparable to those for the senior high with the new programs in biology, chemistry, and physics.

Özinönü (1959) identified and built teaching units around concepts from mechanics, electricity and magnetism, and quantum mechanics. The units were taught over a period of 55 class sessions to a ninth-grade class with above-average intelligence. Instructional activities and suggestions ranging from field trips to suggested reading were designed and ordered to proceed from precept development through qualitative, then quantitative, concepts, to abstract concepts of phenomena. Achievement gains were significant at the 1-percent level. Özinönü also found the correlation between IQ and concept pretest scores (.51) considerably higher than between IQ and general-science pretest scores (.01). Without indicating the basis for the statement, he concluded that pupil interests were broader and more varied as a consequence of this teaching. He also concluded that concepts can and should be identified, and can be learned if suitable learning conditions can be created.

Rosenberg (1957) dealt with the ability of selected eighth-grade pupils to locate relationships among the lever, wheel-axle, and/or pulley; to state these relationships numerically and verbally; and to relate the lever to the wheel-axle and the wheel-axle to the pulley both graphically and verbally. He developed a unique teaching method involving a series of flap-covered diagrams. Pupils had greater success in indicating numerical relationships than in verbalizing the relationships. They were more successful in indicating the relationship between the lever and the wheel-axle than they were in perceiving the relationships between the wheel-axle and the pulley. A suggestion of transfer was detected in the fact that 98 percent of the pupils who succeeded in indicating a numerical understanding of the lever were similarly successful with the wheel-axle. Fifty-five percent were able to relate these two simple machines graphically. This study appears to have considerable bearing on the teaching of science principles by pupil discovery and in suggesting a method for implementing this kind of instruction.

Methods and Organization for Teaching

A new dimension was investigated for the possible improvement of motion picture presentations. Schulman (1959) added introductory sequences to science instructional films in order to determine whether the nature of the sequence had any effect on immediate and delayed recall of factual materials presented in the film. He used a "positive" sequence

which showed the viewer a means to a pleasant goal he was already stimulated to achieve and contrasted it with a "negative" sequence which showed the viewer a means of avoiding an unpleasant situation. Pretests and IQ tests were administered at the start of the experiment. Retests were given immediately after viewing and again two weeks later. Scores were analyzed through the use of analysis of variance and *t*-tests.

Schulman noted that although learning took place regardless of the inclusion of positive or negative introductory sequences, the use of positive sequences resulted in greater immediate recall and negative sequences resulted in greater delayed recall. Boys learned more, in terms of immediate and delayed recall of facts, when the films had positive introductory sequences. No similar significant difference was found in girls' achievement. Irrespective of the nature of the introductory sequence for the films, when immediate recall was measured, "average" pupils profited most from seeing the films. However, their retention over a two-week period of what they had learned from the films was significantly less than that of either the "inferior" or "superior" groups.

The effectiveness of telecasts in helping ninth-grade pupils learn more science as well as predisposing them to further study in science was examined by Champa (1957). Three hundred pupils, boys and girls in equal numbers, were arranged into three groups: a conventionally taught group, a group taught the same content supplemented twice weekly by 15-minute telecasts, and a group taught the same course supplemented by a half hour of the motion picture films viewed each week by the television group. Neither the conventional nor the motion picture group had advantage of the resource people who appeared on television. Evaluation was carried out through pretesting and post-testing with a standardized general-science examination, and teacher-made unit and retention tests. All three groups made significant gains. It was not stated that significant differences existed among the groups. A year later a few more pupils from the television and motion picture groups continued to take science than from the conventional group. Science interests as indicated by the *Kuder Preference Record* and science-related activities were significantly greater for girls in the motion picture group than for girls in the conventional group.

The relationship of pupil achievement to the organizational pattern for teaching eighth-grade science was examined by Dameron (1959) in seven Middle West high schools. The organizational patterns included a core curriculum in which science, social studies, and English were taught in a three-hour time block in both grade 7 and grade 8, a two-semester eighth-grade course with no science in grade 7, and a one-semester science course in grades 7 and 8. Pretesting and post-testing of 1495 pupils showed the pupils' average to be at the 98th percentile on national norms. There was no significant difference in achievement of the pupils in any one of the organizational patterns when mean scores were compared through the use of analysis of variance and covariance with IQ and pretest scores held constant.

Dameron admitted not knowing how far other variables (such as teacher preparation and qualifications and teaching methods) might have influenced achievement. It would appear that the sample used was not truly representative of the typical school enrollments, thus limiting the applicability of the findings.

Achievement

McCutcheon (1957) sought to determine the relative achievement in science and mathematics at the eighth-grade level, using teacher-made examinations, in relation to school organization and enrollment and pupil ability as indicated by pretest and IQ scores. The study was well designed, involving a 4 by 4 block, using analysis of variance and covariance. More than 6000 pupils from a stratified random sample of 74 Minnesota public schools were tested. McCutcheon found statistically significant differences (1-percent level) in achievement in mathematics and science between schools; in science the difference was in favor of boys when pretest and IQ scores were held constant. Groups composed of the top, bottom, and middle 5 percent of the pupils, as determined by IQ, were compared in final achievement in both science and mathematics. Statistically significant differences among the three groups were found.

Norton (1959) sought to answer the question of whether achievement in ninth-grade general science was more closely related to study habits than to intelligence, reading ability, and aptitudes. Study habits were rated by both students and instructors. Achievement in science was measured by a teacher-made objective examination. Zero-order intercorrelations were calculated among test scores for achievement, *Iowa Silent Reading Test*, *Otis Quick Scoring Test*, and an average *Differential Aptitude Test* score, and students' and instructors' rating of study habits and their application; the multiple correlation between achievement and the six variables was also determined for each sex. Teacher ratings of study habits were not more effective than the other measures. In fact, they were less valuable than any other measure for predictive purposes. The average *Differential Aptitude Test* measure was the most significant achievement predictor for boys and girls considered together.

Oakes (1959), in a similar study involving gifted eighth-grade pupils, used a slightly different array of independent variables. The measure of achievement was the *Read General Science Test*, Form BM. The most efficacious battery of predictors of achievement, as included in a multiple regression equation, included the mechanical and verbal reasoning scores of the *Differential Aptitude Test*, the mechanical-interest score of the *Kuder Preference Record*, and the *Read General Science Test*, Form AM score used as a measure of previous achievement.

Studies at the Senior-High-School Level

Biology: Curriculum and Teaching

Science teachers need to beware of changes prompted by external pressures. Change should come out of systematic examination of the objectives of science teaching. Curriculum workers and biology teachers will find Rosen's (1959) study helpful in understanding the historical factors leading to the move away from specialized courses in botany or zoology to the integrated course in biology.

In the high-school biology syllabus, it is important to include recent developments and unifying concepts. As part of the Science Manpower Project at Teachers College, Columbia University, Stone (1959) reviewed and evaluated current textbooks and courses of study for high-school biology. She found little attention to recent developments in biology and only minor attention to theories and unifying concepts.

Howard (1958) compared objectives of biology instruction in today's high schools with those of 40 and 80 years ago by means of an examination of textbooks. Present objectives and content of texts emphasize functional information and interrelationships among living things. Illustrations stimulate critical thinking. Texts of 40 and 80 years ago emphasized factual objectives and memorization of unrelated facts.

Tyrell (1958) asked 2000 members of the National Association of Biology Teachers to state what they believed to be the *most* important area and the *least* important area in biology. Their answers were to be used to construct a high-school biology achievement test. The areas suggested as most important were biological principles, conservation, essential life processes, and human physiology.

Newman (1957) compared the effectiveness of three teaching methods in high-school biology. The lecture-discussion method was used with outside-reading assignments, with textbook reading in class, and with no textbook or reading assignments in or out of class. Alternate forms of the *Nelson Biology Test* were administered as pretest and post-test. Three groups of 53, 56, and 52 pupils respectively were tested. There was a gain for each method of teaching, although none was significantly or statistically superior to the others. No one method was found to be superior for students who scored high on intelligence and reading comprehension. However, among students with low intelligence and reading comprehension, those taught with reading in class showed significant improvement over the others.

Chemistry: Curriculum and Teaching

During the last few years several investigators explored many procedures for teaching chemistry. Fonsworth (1957) attempted to achieve

reflective thinking by applying the methods of science to problems of daily life and human affairs. Both the teacher and the students co-operated in selecting problems and methods of solving them. Results were measured by the IQ, a critical thinking test, and standardized achievement examinations in chemistry. Fonsworth found gains under the reflective thinking approach significant with respect to (a) growth in mental ability, (b) the application of abilities required in critical thinking, and (c) the use of the scientific method in solving chemistry problems.

The nature of thinking in high-school chemistry study was investigated by Sister Ernestine Marie O'Connell (1958), who tested two hypotheses: (a) Inductive laboratory learning produces no higher achievement than does descriptive learning, as measured by the *Anderson Chemistry Test* and the *Cooperative Chemistry Test*. (b) Teaching which includes inductive laboratory learning produces no statistically significant differences in the understanding of chemical-equation balancing from deductive learning and traditional laboratory teaching. Six experimental and six control groups were used to test the first hypothesis. Thirty-two selected schools involving 56 classes and 40 teachers were used in testing the second hypothesis. The findings indicated that the two null hypotheses were rejected. Inductively taught classes showed superiority over the deductively taught classes in the year's work and in the unit on chemical-equation balancing.

Porter and Anderson (1959) concluded that ability to understand and apply the scientific method, with its associated attitudes, in chemical situations is perhaps more closely related to intelligence *per se* than any of the other parts of the chemistry test. Studying relationships of the specified abilities in chemistry to each other and to intelligence, they found the top intellectual group not always superior to the lower groups in achievement, and the middle group not always superior to the lower group. In terms of the total test, intellectually superior students achieved more than the average or lower groups. Except for the ability to understand and apply the scientific method with its associated attitudes, this hierarchy did not exist to the same degree for all the specified abilities in chemistry.

Pierce (1959) developed a modern course of study in high-school chemistry by means of review and evaluation of existing courses and textbooks. Proposals for the new course were submitted to a group of experts for judgment.

The method of performing experiments in high-school chemistry-laboratory manuals versus pupil-devised methods of solving the same problem was investigated by Mark (1958) in 12 classes in six schools. Measurement of acquisition of factual information and the ability to interpret chemical knowledge was accomplished through a standardized chemistry examination after a set of 10 experiments had been performed. A standardized chemistry aptitude examination was given as a pretest at the beginning of the second semester. Although the groups started not differing significantly and did equally well on the factual examination,

the experimental group was significantly (3-percent level) superior in ability to interpret chemical knowledge.

Physics and Physical Science: Curriculum and Teaching

Garside (1959) compared the effectiveness of two methods of instruction in high-school physics, as measured by levels of achievement, with students of high and low intelligence. A total of 690 students, representing 60 schools, were randomly divided into 30 traditional and 30 Harvey White physics films groups. Students were put into upper and lower (27 percent) ability groups. Regardless of method of instruction, the achievement of highly intelligent students was significantly higher than the achievement of students of low intelligence. When equated for intelligence, by means of covariance, there was no significant difference in retention between students of high and those of low intelligence. There was no significant difference in achievement between film and traditional groups; however, retention was higher for traditional groups.

Hubbard (1958) attempted to determine the effect of three teaching methods on achievement in a senior-high-school physics course. One group was taught by television only, another group by television supplemented by a physics teacher, and the third by the same teacher using conventional classroom techniques. No statistically significant superiority of any of the teaching methods was found, and no one of the methods worked better for any one ability level.

Engelhart and others (1958), evaluating the use of television in high-school physics instruction in Chicago, found that students with an IQ above 120 and those with an IQ below 100 apparently profited more from usual instruction than from television instruction. They believed teacher guidance and stimulation are needed by both groups.

Wise (1957) sought to determine whether courses in high-school physics or junior-college physical-science surveys increase pupils' qualitative understanding of physics principles beyond that acquired in junior-high-school general science. His tests, covering 24 principles of heat, were given to 1576 students from 23 states enrolled in 14 junior high schools and 15 senior high schools, and to freshmen and sophomores from 11 colleges. He found that (a) although pupils who have taken general science may expect that a physics course will increase qualitative understandings, a further increase will not accompany a college survey of physical science; (b) students who have taken both general science and physics may not expect a physical-science survey course in college to add materially to their understanding; and (c) a college survey course in physical science is no more effective than general science in developing qualitative understanding of certain principles. The study was concerned with a pertinent question. Unfortunately, there is no reason to suppose that the students and groups under test were from the same population.

How the experiment would have turned out if they had been, if other subject areas had been under consideration, or if quantitative understandings even at minimal mathematical levels had been measured are questions which merit further investigation.

O'Connor (1959) sought to describe and analyze laboratory problem-solving processes of high-school physics students. Although his groups were small (four groups of five each, selected on the basis of rank on ACE-Q scores and IQ ratings) and his findings tentative, his technique of checking steps toward solution of laboratory problems by direct observation and taped recordings of students "thinking aloud" is of interest. He found that pupils of high ability solved more problems than those of lesser ability, although problem solvers were not restricted to any ability group. Those who solved one problem did not necessarily solve others. There were no common patterns of solution or failure to find a solution among the problems, ability groups, or all students. O'Connor believed mental ability and quantitative conceptualizing were not sufficient bases for the selection of potential scientists.

Aptitudes, Interests, and Attitudes

A determination of the relationships between growth of interest and achievement of high-school science students and science-teacher attitudes, preparation, and experience was made by Taylor (1957). Standardized tests, such as the *Minnesota Teacher Attitude Inventory*, the *California Occupational Interest Inventory*, and science sections from the *Essential High School Content Battery*, were used. When considered singly, teachers' attitudes, semester hours of professional education, semester hours of science, and years of teaching experience do not have a positive correlation with student interest or achievement. Significant differences were reported in growth of interest between students who worked with full-time science teachers and those who worked with part-time teachers. No significant difference in achievement for such groups was reported.

Henderson (1957) investigated the interest in physiology of secondary-school pupils, parents, and physiology teachers. A checklist of physiology topics was evaluated by 999 students, 181 teachers, 97 parents, and 14 physicians. The findings indicated that parents and teachers were good judges of pupil interests, but physicians were not. Parents felt sex education was part of a school's responsibility.

Blanc (1958), studying pupil interests in biology, submitted a questionnaire of 92 topics to 60 boys and 60 girls from 10 tenth-grade and eleventh-grade biology classes. The findings indicated that emphasis given topics in textbooks and expressed interest of pupils had little correlation. It was also noted that the higher the first-semester grade, the greater the number of expressed interests in topics.

One of the conclusions reached by Allen (1959) in his investigation of attitudes of certain high-school seniors toward science and scientific

careers was that students do not have a clear-cut understanding of the nature of science and scientific work.

Stoker (1957) surveyed the aptitude and attitudes of high-school youth toward science and scientists and the relationships of these factors to each other and to the personal traits of youth. Among 2500 pupils in grades 10 through 12, a favorable attitude toward science and a social institution was generally expressed. A significant relationship was reported between aptitude and attitude toward scientists as people. Attitudes toward science as an institution and as a vocation and attitudes toward scientists were closely related to students' grades in science and their socioeconomic status.

A study by Behnke (1959) was based on replies from 621 high-school science teachers and 70 scientists. There was disagreement between the groups on 50 tested statements pertaining to the nature of science and scientists in society.

Using two examinations, one to measure the accuracy of one's perception of a scientist and of science and another to measure attitudes toward science and scientists, Belt (1959) tested 516 college-bound seniors from 12 New Jersey high schools and found a generally favorable attitude. Belt was disposed to discount previously publicized studies which expressed concern over the supply of scientists. Perhaps the greatest contribution of the study lies in the nature of the factual-perceptual test used in determining the image the high-school student has of science and of workers in this field.

Business and industry became increasingly involved in the improvement of science instruction. Sund (1959) examined business-industry suggestions made between 1949 and 1958 pertaining to objectives and philosophy, curriculum modification and teaching practices, recommendations for education of the gifted and for vocational and technical training, and teacher training and accrediting. He found many of these suggestions implemented by laboratory exercises, guidance materials, science fairs, assembly programs, and summer employment of teachers and high-school students.

Roper (1956) examined utilization of industry-sponsored instructional materials by Colorado high-school chemistry teachers and found that 96 percent of the teachers used such materials. He listed their reasons for using these materials and the order of their preference for them. Roper wisely suggested careful examination of the criteria by which these instructional materials are prepared.

Summary

Studies selected for review in this chapter were in great measure assembled by the U.S. Office of Education in its regular search for investigations related to science education. Some abstracting had already been

done by members of the Committee for the Review of Research of the National Association for Research in Science Teaching.

An examination of the bibliography will show that about two-thirds of the investigations have not yet been made available to other researchers and classroom teachers, their only publication being in *Dissertation Abstracts*. Moreover, the nature of the study and its findings are often so poorly reported there as to erroneously suggest that the study be examined no further.

The trends of greatest importance lie in the most recent research efforts in curriculum development. The team approach to course-of-study building may prove exceptionally effective. By the time the next issue of the REVIEW OF EDUCATIONAL RESEARCH devoted to science and mathematics is published, a report on the new courses in biology, chemistry, and physics could be available. These programs deserve a thorough evaluation which should answer such questions as what groups the courses are most effective for, as well as the level of achievement attained. Now lacking are studies relating to measurement of achievement or change beyond the level of factual information. Perhaps these measures will be included as part of the evaluation scheme associated with the new curriculums.

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CHAPTER IV

Mathematics in the Secondary School

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DURING the period 1957-1960, a time of ferment in mathematics education, a variety of experiments with new curriculums were conducted at local, state, and national levels. Evaluation of programs is a project for the immediate future. In designing and implementing new curriculums and new approaches, it is important that answers from research be used.

This chapter includes descriptions of experimental curriculums, of the current status of teaching in secondary mathematics, and of controlled experimental studies.

Current Practices and Trends in Mathematics Curriculums

Shetler (1958), by questionnaire, surveyed aims, curriculum, methods, and evaluation in the teaching of mathematics to determine how closely they agreed with research results and proposals. Replies from a 10-percent random sample of secondary schools in 20 states showed disagreement between expert opinion and practices in classroom methods and evaluation. Many teachers reported inadequate equipment and poor library facilities. The teachers who consistently follow recommended practices are those who spend most of the school day teaching mathematics, and those who have professional assistance in teaching. In a related study Diebel (1959) considered the influence of the evaluative criteria of the Co-operative Study of Secondary School Standards in 57 Oregon schools evaluated during the seven-year period 1950-57. This study indicates that the recommendations resulting from these evaluations are sporadically implemented.

One way to study the mathematics curriculum is to analyze textbooks. Izzo (1957) analyzed 627 secondary mathematics texts to determine trends in the use of graphical material. He found increased attention to graphing, especially in connection with locus and analytic geometry in plane-geometry texts. Similarly, Rajaratnam (1957) studied 10 elementary-algebra texts to relate the development of the concepts of variable, function, equation, and equality with the work of mathematicians and logicians. She observed new ideas mixed with outworn and erroneous ideas and terminology. Wilson (1959), examining geometry texts published before 1900, saw authors generally competent mathematically, but not very familiar with good teaching techniques and the learning process.

Wales's (1958) appraisal of texts for purposes of building a course of study was a typical misuse of textbook analysis. From 20 commonly used general-mathematics texts she compiled a list of topics and submitted them

to a selected panel of educators for ranking. On the basis of this appraisal, a recommended program for general mathematics was formulated.

One method of evaluating the effectiveness of a curriculum is to consider its contribution to success in college. Such an approach was used by Knights (1957), who analyzed a test given to entering college freshmen to determine their preparation for analytic geometry. Using these scores as predictors of success in analytic geometry, Knights showed that students need more skill in problem solving, more experience in applying learning, and more understanding of definitions, relationships, and symbols to be successful in analytic geometry.

A first step in a local curriculum reorganization is determination of the current status. In this kind of study, Bruns and Frazier (1957), surveying the variety of experimental programs in operation in Houston schools, found a fairly uniform sequence of algebra and geometry through grade 10 but considerable variation in including topics from analytic geometry and calculus in the upper grades. An interesting new course described was a laboratory geometry course for non-college-bound students.

Evaluating the Content of Mathematics Courses

A variety of new content is being brought into the mathematics curriculum, and the contributions of new topics need to be evaluated as well as those of traditional topics. We have little evidence with which to defend the old or the new. For example, it has been proposed that probability and statistical inference be a possible semester course in grade 12. The achievement of apt high-school juniors and seniors in such a course was studied by Bridges (1959). The experimental class of 19 members obtained significantly higher scores on the post-test as compared to the pretest and as compared to a control group of tenth-graders.

Another curriculum recommendation frequently made is that courses should be functional. Results of an investigation by Bush (1959) of two groups of students at one high school after two years of study do not favor a functional approach. The students with two years of formal mathematics were superior to the two-year functional mathematics students in every category tested. The technique of covariance was used to hold ability factors constant.

The success of curriculum proposals depends greatly on the attitudes of teachers toward the new ideas and their competence to teach them. Spillane (1959) studied the attitudes of Pennsylvania mathematics teachers toward the inclusion of analytic geometry, calculus, and statistics in the high-school program, and considered the teachers' competence to teach these subjects. On the basis of a 76-percent return of questionnaires to 500 randomly selected teachers, he found that teachers favor the inclusion of these topics in high school and feel generally competent to teach these subjects. As would be expected, younger teachers and those who felt competent to teach the subjects were more favorably inclined toward them. Similarly, Leissa

and Fisher (1960) surveyed the attitudes of engineers and college and high-school mathematics teachers toward the recommendations of the Commission on Mathematics of the College Entrance Examination Board. This group was highly favorable toward the recommended changes, being much in favor of including inequalities, sets, vectors, and probability. The group was not so favorably inclined toward including calculus, field theory, group theory, or statistics.

Another frequent curriculum proposal is to eliminate solid geometry as a separate course and include the concepts of three-dimensional space in tenth-grade geometry. To resolve the problem of what topics should compose tenth-grade geometry, Small (1959) submitted a list of 109 solid-geometry concepts to 50 mathematics teachers. Topics approved on 75 percent of 31 returned questionnaires included line perpendicular to a plane, lines parallel to a plane, loci, perpendicular planes, polyhedral angles, area and volume of prisms, cylinders, pyramids, cones, spheres, distances, angles, and areas on a sphere. Topics to be omitted included spherical triangles and congruence of prisms.

The number of experimental mathematics curriculums continues to grow, and projects that have been under way some time continue experimentation. The content and operation of several programs were described by Allen (1958), Brumfiel, Eicholz, and Shanks (1960), Davis (1960), and Keedy (1959b). No experimental project has reported data adequate to permit evaluation of its effectiveness.

The evaluation of a new curriculum will not be easy. A conference sponsored by the American Association for the Advancement of Science, the American Association of School Administrators, and the Council of Chief State School Officers was reported by Hull and others (1958). Its purposes were (a) to develop guidelines for program appraisal and direction in the teaching of mathematics and the sciences, and (b) to evaluate proposals being made for changes in school programs. The report will be found useful by anyone evaluating new curriculums. Putnam and Frazier (1960) compiled an annotated bibliography of state curriculum guides.

Attitudes, Concept Formation, and Understanding in Mathematics

Experimental studies, although few in number, showed concern for the significance of attitudes, the nature of understanding, and the formation of concepts. The significance of maturity and other variables in relation to an understanding of the limit concept was studied by L. T. Smith (1959). Among 578 students in grades 7 through 12, some classes were given three hours of special instruction in limits, other classes equated in mental age were not. Data were collected on a limits test, chronological age, mental age, and grade-point averages in mathematics. Findings showed experience to be important; significant gains in conceptualizing limit occurred at all

levels; chronological age is not a related variable; and mental age is positively correlated with limits test scores.

Troxel (1959) examined relationships within measures of reading eighth-grade expository mathematical materials, and between such measures and intelligence, arithmetic achievement, and general reading ability. He also studied difficulty and interest in relation to purpose as well as reading skills. Based on data from 45 students, sample conclusions were (a) reading purpose influences reading speed; (b) general reading ability is related to speed of reading expository mathematical material; and (c) difficulty is influenced by purposes. Johnson (1957b) analyzed readability of 25 samples of 100 words from each of 18 mathematics texts and proposed use of the modified Flesch formula for determining readability.

Poffenberger and Norton (1959) questioned 390 college freshmen to determine factors relating to attitudes toward mathematics. Factors having the greatest influence on attitude were previous teachers and parental expectations and attitudes toward mathematics. Renner (1957) tested functional competence among 237 Iowa high-school seniors who had taken one year of algebra or general mathematics. Using covariance to control initial difference on the *Iowa Tests of Educational Development*, he found a significant difference in favor of the algebra group over the general mathematics group. E. M. J. Ferguson (1957) developed an observational instrument for describing the algebra classroom in relation to selected aims such as (a) ability to think, (b) appreciation of mathematics, and (c) attitude of curiosity and initiative.

Approaches and Techniques in Teaching Mathematics

Studies of approach and technique emphasized individual differences, the use of visual materials, application, and specialized ways of teaching particular content. Zoll (1957) investigated the relative merits of varying amounts of application in plane geometry. Each of three teachers taught both experimental and control classes equated for intelligence, geometric aptitude, arithmetic and algebraic competency in one high school. Analysis-of-variance techniques showed no significant differences between classes with varying amounts of application and control classes nor among experimental classes in regard to ability to solve "originals," knowledge of facts and principles, or ability to apply facts and principles in practical problems. Ability to apply geometric facts and principles seemed to be associated with individual males of good ability and mathematical competence. With limited statistical and experimental controls, Miller (1959) compared a single-equation approach to solving verbal elementary-algebra problems with a combination of guessing specific solutions and a subsequent multi-equation approach. Thirteen classes split between the methods in one high school were used.

Shoemaker (1957) reviewed the effectiveness of teaching principles of mathematics and science in Ohio public-school trade and industrial pro-

grams and found the current plan ineffective. According to Mazzei (1959), teaching estimation to ninth-grade and tenth-grade students did not help significantly to reduce errors. Kenney and Stockton (1958) equated three groups of seventh-graders (with more than 100 in each group) and compared three approaches to teaching percentage: (a) drill emphasis, (b) emphasis on understanding and reasoning, and (c) a combination of the first two. Using a self-designed test after 19 days, they found progress in the upper three-quarters of all classes, and inconclusive evidence suggesting possible advantages for the composite and understanding approaches.

Among three heterogeneous interest groups totaling 79 plane-geometry students, Griff (1957) observed the effect of one-level and three-level assignments varied quarterly through the year. Using a test of functional work in a one-level approach, he found students doing more and better (1957) reported a limited study of the effect of homework on achievement in plane geometry. Although the matched groups were of restricted equivalence, achievement differences seemed to favor students doing out-of-class work, particularly on cumulative review tests as opposed to unit tests.

Crosby and Fremont (1960) found that small groups in algebra, with testing as appropriate, and freedom of topic choice, provided a better learning climate and effective opportunity for achievement. Although experimental and control groups were used, the study tended to be descriptive. An informal study, without controls, by Ivie, Fowler, and Graham (1958), indicated that use of small groups in algebra, geometry, and business mathematics provides a good learning situation. However, superior students showed limited desire to progress, and some students felt the need for class activities. Ilioff (1957) investigated the effect of systematic home-school co-operation on the achievement of eighth-grade students. Increased parental understanding had a consistently positive effect on pupil achievement.

Studies of Association and Prediction in Mathematics

Studies dealt with associations among mathematics achievement, school size, student ability and sex, teacher attitudes, curricular choices, and school policies. McCutcheon (1957) analyzed achievement in eighth-grade mathematics (and science) in relation to school organization, enrollment, and pupil-teacher factors in Minnesota public schools. A stratified random sample of 85 schools was used. Pretests and post-tests in mathematics, designed by the experimenter, and an intelligence test were administered. A total of 378 teachers answered questionnaires and 6471 students participated. Analysis-of-variance and covariance techniques led to such findings as the following: (a) there were no sex differences in final achievement with adjustments for initial differences; (b) girls scored higher on the pretests, post-tests, and intelligence tests; and (c) significant differences in achieve-

ment among the upper, middle, and lower 5 percent in intelligence were noted.

Pruett (1960) studied mathematics and science achievement of 44,649 ninth-grade pupils in 618 Indiana private and public schools. Girls did better than boys in mathematics, and the better mathematics students were found in schools with large enrollments.

Using 29 teachers of first-year algebra and 1643 pupils in 13 schools in a large midwestern city, McCardle (1959) related scores on the *Minnesota Teacher Attitude Inventory* (MTAI) to pupil achievement. He found pupils with teachers having high MTAI ratings profited most in quantitative thinking and functional competence; teacher attitudes were not significantly related to algebra achievement.

McKinley (1960) sought a relationship between achievement in a twelfth-grade probability and statistics unit and intelligence, reading comprehension, previous mathematics achievement, and previous mathematics experience. The study extended for only 13 class periods with 10 classes in nine schools. A maximum multiple-correlation coefficient of .68 was found with achievement and three intelligence factors, reading comprehension, and previous achievement in mathematics. McKinley believed such a unit desirable for college preparatory students and that aptitude for such work could be measured to a significant degree. Dinkel (1959) found a multiple correlation of .86 between algebra achievement and a series of seventh-grade and eighth-grade predictive variables, including previous grades, intelligence, and prognostic and achievement tests.

In an analysis of Wisconsin school policies as related to students' choice of high-school mathematics courses, Parkinson (1959) observed that (a) schools with college preparatory tracks enrolled a larger proportion of students in algebra at the ninth-grade level than those without; other schools enrolled larger proportions in grades 10 through 12; (b) 57.2 percent of the schools had college preparatory tracks and 70 percent of these required at least four semesters of mathematics for college preparatory students; (c) mathematics achievement, teacher reports, and IQ scores were influential in mathematics guidance; and (d) students indicated the importance of out-of-school factors, particularly parents, in the choice of mathematics courses. Stone (1959) saw an increase in enrollment in elective mathematics and science as possibly related to students' reaction toward teachers in introductory courses.

Secondary Enrollment, Teacher Characteristics and Preparation

Studies pertaining to enrollment and teacher factors include broad national studies, state-wide investigations, and proposed training programs. The most critical problem was the lack of properly trained teachers.

The National Education Association Research Division (1958) surveyed enrollment, curriculum revision, and facilities for mathematics and science

in U.S. secondary schools. Of 1957 high-school graduates, 14.4 percent had four or more years of mathematics; 22.9 percent, three years; 35.2 percent, two years; 25.6 percent, one year; and 1.9 percent, none. Principals tended to select teachers on the basis of skill in instructional methods rather than subject-matter preparation. Curriculum revision was reported in about half the schools. Facilities were seen as lagging. The large comprehensive high school was singled out for its contribution to preparation in mathematics, teacher qualification, curriculum, and facilities. Maul (1958) reported on teacher supply and demand in mathematics and science. The supply of candidates for high-school mathematics teaching decreased each year over a five-year period; one out of every three newly qualified persons did not teach. Turnover was great in what was described as an improved but still critical situation.

Teaching load and qualifications were summarized by Brown (1960). Mathematics enrollment in grades 9 through 12 was 4.4 million in 1956 and 4.5 million in 1960. About 100,000 seniors were unable to get advanced mathematics in small high schools. In 1957 about 43 percent of schools had curriculum studies in progress. In that same year secondary teachers averaged 23 hours preparation in mathematics; 7.1 percent had no mathematics; one-third were mathematics majors; and one-third had the master's degree but not usually in mathematics. Ahrendt (1958) believed that student enrollment and interest in mathematics were greater than generally claimed but that the shortage of adequately trained mathematics teachers was more critical than generally realized.

Torrance (1958) analyzed the extent of change in Minnesota mathematics and science teaching, using a 50-percent random sample of public secondary-school principals and superintendents. Four-fifths reported recent or pending decisions to improve their programs. Summer institutes and training programs were strongly supported. Finding and retaining qualified teachers was a major problem. Lohela (1958) studied enrollment characteristics and teacher preparation in Michigan secondary-school mathematics. Enrollment in mathematics decreased from 1925 to 1950 but has increased since. Nonpublic schools in Michigan enrolled a higher proportion of students in mathematics than public schools. Large schools had better prepared and more experienced teachers than smaller schools. Enrollment in mathematics dropped off rapidly for each succeeding grade, especially among girls. Teacher questionnaires revealed interest in practical application, realistic student teaching, college topics geared to the secondary school, preparation for dealing with individual differences, and instruction in motivation and class management.

Small (1957) sent a 52-item questionnaire to 1465 members of the National Council of Teachers of Mathematics to discover recommended aspects of a fifth year of preparation for mathematics teachers. Responses proposed 50 percent mathematics and not more than 25 percent professional education, with some work in research, advanced teaching, and cultural areas. Topics of interest were number theory, mathematics history,

mathematical statistics, modern algebra and geometry, theory of equations, mathematics of finance, adolescent growth and development, and measurement. Jorgensen (1958) outlined characteristics and advantages of an inservice institute.

Nelson (1959) received 100 usable questionnaires from 154 Nebraska secondary mathematics teachers designated as superior or above average by their administrators. Classes in 46 schools were visited and 2188 students were queried. These capable teachers entered the profession because they liked mathematics, selected their careers in college, participated in professional growth activities, taught upper-level courses, used a wide variety of methods, and were concerned about improving their teaching. The students of these teachers praised their explanations, helpfulness, and personalities.

Programs for the Gifted Student in Mathematics

Although much space was devoted to special programs for the gifted, few studies evaluated their effectiveness. Long (1957) examined an enrichment program in four classes of 98 randomly selected students. In two experimental classes talented students served as group leaders, presented new topics and materials, gave special reports and projects, and participated in contests. Activities for all of the experimental group included weekly review, extra-credit problems on the tests, and special projects. Both the control and the experimental groups received the same basic instruction from the same teacher and the same topics, assignments, and tests. On two achievement tests and an attitude inventory both the talented and the nontalented in the experimental group surpassed the control group in both achievement and attitude. As this study was carefully designed, used appropriate statistical tools, was extended over a school year, and applied principles of randomization and controls, considerable confidence can be placed in the implication of the contributions of an enrichment program.

Wells (1958) reported an informal experiment with a modified curriculum for capable students in one eighth-grade algebra class. Achievement of the 25 high-ability eighth-graders was comparable to that of ninth-graders completing a similar course. The former achieved as well as or better than the ninth-grade control group.

One of the problems in setting up a program is identification of superior students. Cherry (1958) selected 90 eighth-grade students out of 1600 on the basis of an aptitude test, an achievement test, a reading test, an intelligence test, and teachers' recommendations. Although this method was accepted by students and parents, Cherry urged continued study of individuals and flexibility of assignment. In a similar study, M. B. Jones (1959) found that Maryland schools use teacher recommendations, previous achievement records, intelligence test scores, and achievement test scores

to select the rapid learners. Over 90 percent of the participating schools reported the practice of ability grouping. Almost 60 percent provided special courses for their high-ability students.

Various programs have been advocated. Devine (1960) described a seminar to provide an accelerated program for gifted senior-high-school students, and Elder (1957) described a seminar to provide an enriched program for gifted junior-high students. Summer seminars supported by National Science Foundation funds with emphasis on topics from contemporary mathematics were described by Nichols (1960), M. L. Ferguson (1960), and Nielsen and Gohman (1959). Ferguson's findings from a state-wide summer program at eight centers in Tennessee indicated significant gains in subject-matter achievement by the experimental group, but no significant gains in ability to use knowledge for problem solving.

The national contest sponsored by the Mathematical Association of America and the Society of Actuaries was described by Fagerstrom and Lloyd (1958). The test used in this contest emphasized mathematical insight rather than isolated facts or skills. Pruitt (1960) and Keaveny (1959) described programs for grades 8 through 12 which are essentially acceleration programs with content similar to that of traditional courses in algebra and geometry. Elementary algebra is taught in grade 8 and intermediate algebra in grade 9. Plane and solid geometry and trigonometry are completed in grade 11 so that an advanced course such as mathematical analysis can be given in grade 12.

Teaching Mathematics via Television

Even though interest in and support for educational television have increased in recent years, relatively few efforts have been made to use television to teach mathematics. Wells (1959) compared the effectiveness of television-correspondence study of first-year algebra with that of direct teaching. Students in 11 small Nebraska high schools apparently achieved as well with television-correspondence instruction as with direct instruction. In another experimental study involving three classes in each of nine schools, Jacobs and Bollenbacher (1960) compared the effectiveness of televised lessons in seventh-grade mathematics with the results of conventional instruction. The year-long experiment used 20 minutes of live telecasts three days a week followed by 30 minutes of discussion. Care was taken to insure randomness, replication, control of variables, acceptable evaluation instruments, and proper statistical tools. The television method was found to be superior for the average student, but the conventional approach proved better for superior students. Other television projects are described by Berger (1958) and Andrews (1960). Extensive experimentation at different levels with valid evaluation of all objectives needs to be made before we can know the extent of television's contribution to mathematics teaching.

Facilities and Equipment for the Mathematics Classroom

The National Defense Education Act has provided funds for improved facilities and equipment, and several surveys have been conducted to determine needs. The U.S. Office of Education study by Obourn and others (1960) surveyed with a questionnaire a random sample of 1207 high schools to obtain information on rooms, furniture, equipment, teaching aids, and library facilities, as well as on methods of purchasing and sources of money. Findings are that classroom facilities are usually inadequate and that fewer than half the mathematics teachers replying use commercial or improvised equipment even though models were rated the most valuable teaching aid. Another government survey by Martin (1960) reported requirements and recommendations of state departments of education in regard to facilities, equipment, and instructional material for teaching science and mathematics at the elementary-school and secondary-school levels.

College Preparation and Entrance

Despite considerable emphasis on mathematics preparation and curriculum changes, few investigations have reported implications for college entrance and preparation. G. B. Smith (1958), analyzing the preparation of 1124 freshmen entering the University of Kansas in 1956, found that 29 percent of the men and 5 percent of the women had four or more years of mathematics. Forty-seven percent of arts and science students, 81 percent of engineering students, and 28 percent of fine arts students had three years.

Keedy (1959a), using questionnaire returns from 134 engineering schools, learned that 38 required solid geometry for entrance; he concluded that solid geometry was not significant in relation to entrance to engineering. Brant (1960) followed up Keedy's study by asking 51 schools with some kind of solid-geometry requirement if they would accept a one-year course of plane, solid, and co-ordinate geometry. In the few instances where a solid-geometry requirement still existed and in the vast majority of remaining courses, a fused course would be accepted. Thus while three-dimensional concepts were still judged important, solid geometry, as such, was an uncommon requirement.

McLean (1960) surveyed the status of integrated algebra-geometry courses in California and sought to determine the acceptability of such courses to teachers and college directors of admission. Integrated courses were not commonly found, teachers disagreed as to the value of such courses, and colleges generally accepted such courses except for science majors. It was suggested that integrated algebra-geometry courses be offered only as a second track in the college-preparatory mathematics curriculum.

Comparative Mathematics Teaching

With increased interest in American education, more attention has been given to what is done elsewhere. Many teachers have visited other countries, and numerous informal observational studies describe a variety of mathematics programs and suggest comparisons.

Woodby (1957) found in French secondary schools emphasis on national examinations and attention to modern mathematics, statistics, and co-ordination of physics and mathematics. Reform objectives were (a) classes four hours a week with no more than 40 students, (b) one hour a week in directed study ("half classes"), (c) better co-ordination of secondary and vocational programs, and (d) addition of suitable modern mathematics.

Wood (1958) discussed the expansion of secondary education in South Australia, the problem of appropriate mathematics courses for less able students, the virtual elimination of solid geometry, and the shortage of adequately trained teachers. Vogeli (1960), describing the mathematics program in Soviet 10-year schools, reported three trends: (a) polytechnism, (b) effort to lighten students' academic load, and (c) effort to raise the scientific level of mathematics instruction. Rourke (1960) observed these proposed changes in Russian secondary mathematics teachings: (a) elimination of trigonometry as an independent subject, (b) inclusion of analytic geometry in function study, (c) addition of computational trigonometry to geometry, and (d) addition of differential calculus to the eleventh year. Soviet self-criticism included (a) lack of emphasis on understanding, (b) liberalism in grading, and (c) lack of uniform standards.

Wirszup (1958, 1959) discussed the mass problem-solving contests held for Polish secondary students and mathematics requirements for secondary students in the Soviet Union, Poland, Czechoslovakia, and Red China. According to Rollett (1960), because of examinations and government assistance, secondary mathematics teaching in England tends toward uniformity, even though schools are free to plan curriculums. Up to half of advanced secondary mathematics was devoted to mechanics and often included elementary statistics. Bodenman (1959) described mathematics requirements and content in the Federal Republic of Germany. Pólya (1960), discussing the teaching of mathematics in Switzerland, noted emphasis on specialization after grade 7, emphasis on subject matter in teacher training, the advanced nature of mathematics in university preparatory schools, and the lack of recent or likely change.

Doremus (1957) reported on an exchange of test data between British and New Jersey schools. Gattegno (1958), visiting U.S. schools, observed (a) an unusual lack of professional trust of teachers, (b) little productive research, (c) need for relating course content to grade level, and (d) emphasis on instruction rather than on learning. A. W. Jones (1958) also visited American classrooms and noted (a) failure to make mathematics interesting, (b) failure to integrate algebra and geometry, (c) over-

reliance on textbooks, (d) emphasis on time units rather than on understanding, (e) less emphasis on mental arithmetic than in Australia, (f) poor blackboard and student work, and (g) less time for individual help and work than in Australia.

Research Reviews and Proposals

Financial support by governmental agencies and foundations for research in mathematics education should result in improvement in quality as well as quantity of research in mathematics education. An illustration of this support in action is the U.S. Department of Health, Education, and Welfare, Office of Education (1960) report of a conference on "Psychological Problems and Research Methods in Mathematics Training." This conference brought together mathematicians and psychologists to discuss approaches to research in mathematics education, and the report provides a guide for investigation of mathematics education. It includes a review of completed research, formulation of problems in the learning of mathematics which should be investigated, and research methods and designs appropriate to the conduct of such studies.

The U.S. Office of Education continued its semi-annual survey of research in mathematics education. The latest surveys by Brown and Kinsella (1960) and Brown (1958) included a summary of completed studies during 1957-58 as well as a listing of questions which need solutions. Unfortunately, this survey is not a complete listing of all research in mathematics education in 1957-58, since many persons fail to submit information on the research completed.

Summary

Studies reviewed in this chapter point to these general conclusions: (a) there is urgent need for more well-trained secondary mathematics teachers; (b) facilities for the teaching of mathematics need substantial improvement; (c) although much curriculum development has occurred, there is yet need for co-ordination, better definition of goals, concepts, and understandings, and adequate evaluative research; (d) although teaching by television has attracted much interest, the appropriate uses of such instruction are not yet clear; (e) some evidence suggests that we have in many instances expected too little from our students; however, the precise implications for secondary mathematics and the secondary school as a whole are still a moot point; (f) much curriculum study has been fragmented with emphasis on one level or another rather than concentration on the total program; (g) opportunities for the talented student have been greatly extended, but again without adequate evaluation and without adequate attention to the total situation.

Research should make maximum use of the techniques, instruments, and conclusions of previous studies of related problems. Johnson's (1957a)

summary of the implications of studies in the psychology of learning is indicative of the contributions to be found outside the field of mathematics.

In view of the increased cost and complexity of a well-designed study, Brown (1958) suggests that (a) key problems be identified by groups of teachers and schools; (b) problems be investigated by means of a team approach rather than by individuals; (c) results be published and distributed to avoid duplication and to suggest deeper studies. These are basic needs.

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CHAPTER V

The Academic and Professional Preparation of Teachers of Science

HERBERT A. SMITH and GUY B. HOMMAN

THE PERIOD reviewed has been marked by an intense interest in problems associated with teacher education for science. Reports have come from professional associations, accrediting agencies, state departments of education, and other independent groups, but research investigations, as such, are relatively meager. There is an extensive literature which includes many tacit assumptions untested by objective inquiry. However, because of the impact which many of these reports are likely to have on teacher education, some are noticed here.

Central themes which relate to the training of science teachers recur. They may be grouped into the following categories: (a) an increased concern that a modern view of the nature of science as process and as a mode of inquiry be developed; (b) a more adequate program of science training suited to the needs of elementary and secondary teachers; (c) a more realistic understanding of the complexity of the teacher's task; and (d) a recognition of the need for broadly educated teachers with balanced training in general, professional, and academic areas.

Background and Philosophy

Hurd (1958) contended that science should be taught as an intellectual achievement of man stemming from his desire to understand the forces which control and give meaning to the physical and biological world, the aim of instruction being depth and quality of understanding. The usual descriptive cataloguing of information in a taxonomic classification is unsuited to the achievement of objectives compatible with a real understanding of the scientific endeavor. Hurd further pointed out that teachers in the future will require training which considers conditions that influence scientific discovery, the nature of the creative process, and the tools employed.

Teacher Orientation

A number of articles dealt with the teacher's orientation to his task. Hurd called attention to the teacher's function as interpreter and mediator and distinguished between the kind of training this requires and the kind of training necessary for research scientists.

Brown (1958) and Garrett (1959) both argued the impossibility of training secondary-school teachers in four years and believed that five or even six years' schooling may eventually become standard practice. Schwab (1960) urged thorough reorientation to the role of the laboratory for the prospective science teacher. The laboratory, he contended, should be viewed as a place where nature is seen "more nearly in the raw" and where "things seen" are used as occasions for the invention and conduct of programs of inquiry. Present-day programs do not adequately provide this kind of training.

The National Association for Research in Science Teaching (1960) and Boeck (1960) urged more serious consideration to higher-order objectives in teacher training. They saw need for achieving the "pervasive objectives" of science instruction: appropriate attitudes, appreciations, and skills identified with critical thinking.

Teacher Training

Smith (1959) discussed the components necessary to the training of science teachers. Garrett (1959) and Hurd (1958) pointed to the need of a mathematical background. Brown (1958) discussed programs designed to enhance the competence of teachers. Pierce (1960) and Mallin (1958) emphasized science teachers' need for both breadth and depth in subject-matter content.

Preservice Education

A number of studies supported the contention that many teachers, both elementary and secondary, are not adequately qualified to teach science.

Preparation of Elementary-School Science Teachers

Challand (1956), studying practices and conditions of science teaching in elementary schools in Illinois, appraised those practices by established principles of education. In general, teachers were concerned with appropriate objectives but failed to provide adequate opportunities for achieving them. They made insufficient use of materials and methods suited to instruction in science. Their training favored emphasis on biology over the physical sciences, and two-thirds of them had never had a course in audio-visual education. Only one-third of the schools offered an inservice program which provided opportunity for professional growth in science content.

Tyndall (1960) examined the science program at Atlantic Christian College for prospective elementary teachers, compiling high-school and college courses taken and computing grade-point averages. Separate check-

lists were employed for observations of teaching, and an interview checklist was used. Teachers generally did not perceive the importance of "laboratory-like" classroom teaching. An important finding was the lack of a significant relationship between the courses taken and the quality of teaching. This needs extensive and considered examination in view of the current emphasis on "depth" of training. It should be noted, however, that Tyndall's checklists may not have been appropriate to determine such a relationship. For one thing, the responses were subjectively evaluated. Perhaps the general question of the value of such training is more appropriately related to student performance *per se*. Tyndall made a number of recommendations for improvement of the Atlantic Christian College program, and some should be useful to other institutions.

Gega (1958) investigated problems of California teachers in presenting elementary science and the adequacy of college methods courses to meet these problems. He set forth a number of findings, conclusions, and recommendations. Problems were associated with (a) recent philosophies and points of view, (b) the inadequacy of teacher-training programs, and (c) teachers' unawareness of the problems of teaching elementary science, especially those related to objectives and evaluation. Among his recommendations were that (a) admission to the methods course should be contingent on passing a subject-matter examination and (b) methods courses should be taught by a faculty member with elementary-school teaching experience. The findings, conclusions, and recommendations of this study seem to have quite adequately circumscribed the major problems identified with the preparation of elementary teachers for responsibilities in science instruction.

Preparation of Secondary-School Teachers for Science Teaching

A large-scale study of science and mathematics teaching facilities, by the National Education Association Research Division (1959), revealed that among 5200 science teachers questioned, about half (49.3 percent) were employed as full-time teachers of science. Experienced teachers were better prepared in terms of credit hours than beginning teachers, although the differences were not marked.

The most disconcerting fact reported was that more than 5 percent of all teachers have only nine or fewer credits in science, and 0.3 percent have no training in science at all. Between 21 and 22 percent have fewer than 20 hours in science fields. These facts do not consider the appropriateness of the person's science background to his current assignment, and thus present a more optimistic view than is warranted. This study also sampled the opinion of principals on factors necessary to improve teaching. The greatest single need they saw was increased and more up-to-date knowledge of science.

Brown and Obourn (1959) studied qualifications and teaching loads of 1393 mathematics and science teachers in three states, examining such

factors as age, recency of training, degrees held, teacher migration, and professional and academic preparation. An average of 47.4 semester hours in college science was reported for 98.5 percent of the science teachers; however, 1.5 percent had no college training in science. They found that there were deficiencies in the general backgrounds of many science teachers in related science fields, in mathematics, and in professional training.

Gardner and Richardson (1960) analyzed Ohio State Department of Education reports of principals for 1957-58, collecting data on 2222 teachers. Their findings, paralleling the findings of the NEA study at the national level, revealed that 5.07 percent of the biology teachers, 6.63 percent of the chemistry teachers, and 9.58 percent of the physics teachers had no credit in their teaching area. Fewer than half the physics teachers had as many as 15 hours credit in physics. The low level of training in their teaching field cannot be attributed to a low level of educational attainment. More than 35 percent of the teachers had the master's degree, and 63 percent had the bachelor's degree. Only 29 of the 2222 had not earned the equivalent of a bachelor's degree.

Pella (1958) analyzed Wisconsin Department of Education data on the academic training of 258 physics teachers, 367 biology teachers, 261 chemistry teachers, and 407 general-science teachers. The categories were not mutually exclusive; for instance, a physics teacher might also be included as a general-science teacher. More than 4 percent of the teachers had no academic training in the subject taught. The general problem of variability of training and appropriateness of assignment is again encountered, however, since the median number of hours in science for part-time and full-time science teachers was 42 for physics teachers, 41 for biology teachers, 43.3 for chemistry teachers, and 39 for general-science teachers. Excluding general science, the average preparation of the Wisconsin science teachers was 17.5 semester hours in the specific subject taught.

Pella pointed out that college credit as a sole criterion for competence to teach in a particular area may be suspect, and saw both a quality factor and a time factor affecting adequacy of background. A study by Koelsche (1959) of Ohio teachers revealed essentially the same findings. Several studies revealed, directly or indirectly, a high rate of turnover and short professional life of science teachers. In a small and limited study, Winier (1957) observed that science majors are frequently interested in becoming administrators.

By questionnaire, Novak and Brooks (1959) recorded the judgment of 196 high-school teachers of science as to the preparation necessary to teach high-school science. They found the teachers' recommendations modest in terms of required college preparation, but that even their modest recommendations exceed certification requirements. Many science teachers are themselves satisfied with little or no basic college course work in science subjects taught in the high school.

Inservice Programs for Science Teachers

The need for inservice training of many teachers is conclusively demonstrated by the previously cited studies. Extensive opportunities for securing such training exist. Peterson (1959) reviewed the many educational programs supported by the National Science Foundation.

Schlessinger (1957), polling 934 participants in the 1956 NSF summer institute program, received 83-percent response and found that fewer than 0.7 percent of the participants had no degree, 43.6 percent held a bachelor's degree, and 53 percent had both master's and bachelor's degrees. One-third of those with master's degrees had majored in science or mathematics. Participants in the NSF institutes were better trained than the majority of science teachers, and respondents believed that the primary objective, to increase subject-matter competence, had been accomplished. Schlessinger saw need for graduate courses in content fields for high-school teachers and for a course emphasizing methods and techniques of science and mathematics teaching at the high-school level. It is perhaps significant that Kessel (1958) and Mallinson (1958), working independently, identified a considerable trend toward the implementation of graduate programs more specifically designed to meet the needs of science teachers.

Sims (1958), developing an inservice program for elementary teachers, held 11 sessions during the school year. A pretest and a post-test in science were administered to fourth-grade and fifth-grade classes whose teachers participated, and the results were compared with those obtained in control classes whose teachers did not participate in the program. Statistical analysis, which held intelligence and pretest scores constant, showed that the experimental classes achieved more on the post-test than the control classes.

Teacher Certification

The period under review saw an intensification of interest in certification and related problems, and there were co-operative efforts by diverse professional groups to improve present programs. Though the impact of this work will be great, it is not reported here since it hardly qualifies as research. Certification requirements for science and mathematics teachers in the United States were examined by Sarner and Frymier (1959). In the subject-matter area, requirements ranged from zero to 24 semester hours in mathematics, zero to 48 semester hours in science, and 12 to 24 semester hours in professional education. Some states accept high-school work toward meeting the requirement. The authors, observing that certification requirements are not uniform and are generally low, saw need for a uniform minimum code of requirements. They reported that 10 states have increased certification requirements or are currently considering revision.

Miscellaneous

A number of articles dealt with facilities and materials for a teacher-training program. Richardson and Schlessinger (1960) described facilities available for the science-teacher training program at the Ohio State University, a flexible classroom-laboratory.

Summary

Great shortcomings exist in the competence and preparation of elementary and secondary science teachers. Research has not really come to grips with the qualitative aspect of training programs. Considerable attention is given to quantity of training in terms of course hours and, to some extent, the competencies desired. Nevertheless, specific studies designed to determine the quality of existing programs are conspicuous by their omission.

To satisfy the need for both depth and breadth in training, the four-year bachelor's degree program is less and less adequate as preliminary training for secondary science teaching. Existing programs for elementary school teachers are extremely inadequate. There is uncertainty as to responsibility for teacher training. It is not universally regarded as a responsibility to be shared co-operatively by professional departments, academic departments, the teaching profession at large, the state departments of education, and administrators. Continuing problems are turnover of personnel, movement of teachers into administrative positions, and means to attract high-quality young men and women to science and mathematics teaching.

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CHAPTER VI

The Academic and Professional Training of Teachers of Mathematics

JOHN A. BROWN and JOHN R. MAYOR

WITHIN the last three years, thousands of mathematicians and teachers of mathematics at all levels have taken part in studies designed to ascertain ways of improving mathematics instruction. No earlier review period has seen investigations comparable to the current massive effort and its results.

The investigations have been concerned with mathematics programs from the kindergarten through the graduate school. A first goal of many studies has been the production of sample course materials; the implications for and effect on teacher education are far-reaching. The academic and professional training of teachers must take into account the changing mathematics curriculum. All the groups preparing and trying out new materials have recognized the related teacher-education problems, and almost all have carried on investigations specifically concerned with teacher education. Jones (1960) emphasized implications of research in mathematics for teacher education in a paper before the American Association of Colleges for Teacher Education.

Some 20 separate studies in mathematics curriculum were under way during the review period. The School Mathematics Study Group (SMSG) of mathematicians and teachers in all parts of the country, which has an advisory committee appointed by the presidents of the three major national mathematical societies, has offered its co-operation to all independently operating centers of activity and is in a position to take advantage of the good work of the other groups. A major concern of the SMSG is teacher education. Another kind of investigation which has equally far-reaching implications for teacher education is the growing interest of psychologists in learning theory as related to mathematics. This research is best exemplified by the work of Bruner (1960).

Research in mathematics and science is often classified as basic or applied. Duncan and Frymier (1960) made this distinction for research in teacher education. This review, more concerned with applied research, reviews studies peculiar to mathematics-teacher education rather than studies which have implications for teacher education generally. Moreover, a greater proportion of the former is clearly applied, particularly the investigations of course content. Research dealing with the way children learn mathematics, since it has important implications for other fields, may come to be classified as basic.

The first group of studies noted here consists of those which bear on research in teacher education and give promise of determining its direction for the rest of this century.

Studies Affecting Research in Teacher Education

The College Entrance Examination Board (CEEB) Commission on Mathematics (1959b) recommended that algebra be presented from the point of view of contemporary mathematics. The Commission stated that the goal of instruction in algebra should be oriented toward the development and understanding of the properties of a number field. Both skills and concepts were pointed to as essential.

There has been, and continues to be, extensive research in the development of new algebra courses. The School Mathematics Study Group (1960) course covers essentially the same ground as a conventional first-year course but differs in that it is based on structure properties of the real number system. Simple deductive proofs are developed from carefully worded definitions and axioms. The University of Illinois Committee on School Mathematics (UICSM) (1959 a, b, c, d) algebra course also emphasizes structure and uses the language of sets and logic. Exercises are carefully developed to facilitate discovery of mathematical ideas by the student. The Ball State experimental algebra course stresses axiomatic structure, and students are expected to proceed intuitively. Concepts of set theory and logic are studied. Brumfiel (1959) reported that students who have taken the Ball State course do better in axiomatic geometry than others.

Research by Piaget, Inhelder, and Szeminska (1960) indicated that youngsters can grasp the idea of logical operations basic to probability such as disjunction and conjunction. Statistical manipulation and computation were seen as tools after the idea of probability is intuitively grasped. Probability as an alternative high-school course was recommended by the College Entrance Examination Board Commission on Mathematics (1959a).

The Commission also recommended the following content for a geometry course (or mathematics) for grade 5: informal geometry, deductive reasoning, a sequence of theorems culminating in the Pythagorean theorem, co-ordinate geometry, and solid geometry. SMSG geometry differs from conventional geometry in its postulational system, which is like that of Birkhoff and is complete. A distinguishing feature is the free use of the real number line. The topics covered in the text are fundamentally the same as the topics covered in conventional high-school geometry books.

The Commission and the SMSG agreed on the desirability of a course in elementary functions for one semester of the senior year. Schools are now trying out the probability course prepared by the Commission, and a course in matrix algebra prepared by SMSG, as possible second-semester

courses. MSG and the University of Maryland Mathematics Project developed new materials for use in grades 7 and 8. Garstens, Keedy, and Mayor (1960) emphasized careful use of language and attention to structures in the Maryland course.

Hendrix (1960) emphasized the large role played by nonverbal communication between teacher and student and pointed out that research in paralinguistics is successfully classifying the nonverbal behavior which human beings learn to recognize in each other. The role of an inspirational teacher of mathematics in the learning process was studied by Sanderson and Anderson (1960), who concluded that mathematics teachers judged to be inspirational by students favorably affect achievement as measured by a mathematics usage test, but that this superior achievement seems not necessarily to carry over into other academic areas.

Hutson (1960) reviewed major content requirements in Pennsylvania and all-university control of teacher education at the University of Pittsburgh. In an analysis of teaching loads in Pennsylvania secondary schools with 500 or more students in 1958-59 (schools of this size enroll 84.9 percent of Pennsylvania students), he reported 232 full-time teachers of mathematics (compared with 37 mathematics-science teachers and 18 mathematics—social-studies teachers). Burger (1960) studied teaching load and preparation of 1037 mathematics teachers in Kansas for 1957-58. Sixty percent of the teachers were over 35 years of age, and 66 percent had been in their present positions no more than five years. Slightly fewer than one-third had majored in mathematics. One-eighth of those who held the master's degree had majored in mathematics at that level. Twenty-one teachers had no college credit in mathematics. Only 42 percent had completed a year's course in the calculus.

Attempts to assemble specific information on preparation and teaching load of mathematics teachers continued. Brown (1960b) reported a sampling study made in three states by the U.S. Office of Education. A sampling study for the country is being developed by the Teacher Preparation-Certification Study of the National Association of State Directors of Teacher Education and Certification, following some of Brown's procedures and making use of the U.S. Registry of Junior and Senior High School Science and Mathematics Teaching Personnel (*American Mathematical Monthly*, 1960d).

Course Offerings for Secondary-School Teachers

Academic training of mathematics teachers will be largely determined for the next decade or longer by recommendations of the Mathematical Association of America Committee on the Undergraduate Program in Mathematics (CUPM) (1960). CUPM and MSG work in close association. Three groups connected with the American Association for the Advancement of Science carried on careful studies of mathematics-teacher

education, as a part of science-teacher-education studies. A new department of the *American Mathematical Monthly*, called "Mathematical Education Notes," made possible dissemination of information on local, regional, and national studies. It is accurate to state that research in mathematics-teacher education for the period of this review was largely concerned with academic training.

Anderson (1960), Buck (1959), Busemann (1960), Denbow (1959), and Meder and others (1959) described specific undergraduate courses to prepare for teaching, including algebra, analysis, geometry, probability and statistics, and computing machinery. The issue of whether these courses should be for teachers only was not clearly resolved. Northrop (1959) reported on a new course for teachers in which preparation of teaching units is related to content studied.

Six authors reported on methods courses in mathematics for prospective secondary-school teachers (*American Mathematical Monthly*, 1960b) which were developed after local experimentation and tryout. These courses are offered by a mathematics-department staff member in cooperation with the department of education. Learning through personal, purposeful involvement in the learning situation was analyzed by Richardson and Schlessinger (1960), discussing a center for science and mathematics education.

Committee recommendations for undergraduate course sequences sometimes included a fifth year. There was general agreement among the CUPM; the CEEB Commission on Mathematics; the American Association of Colleges for Teacher Education and American Association for the Advancement of Science, Joint Commission on the Education of Teachers of Science and Mathematics (1960); the American Association for the Advancement of Science Cooperative Committee on the Teaching of Science and Mathematics (1960), in their "Garrett Report"; and the National Association of State Directors of Teacher Education and Certification and American Association for the Advancement of Science (NASDTEC-AAAS) study, reported by Young (1960), that year courses in calculus, modern algebra, and geometry are essential for secondary-school teachers. There was some disagreement on details and related study. For example, the AAAS groups recommended more work in the physical sciences than did the others, and there was different emphasis on probability and statistics.

The most vocal critics of education referred less to European practices as they learned more about American. Lindquist (1960) reported that Russian secondary-school teachers are trained as subject-matter specialists in a five-year pedagogical institute based on 10 years of general education. Within every five-year period teachers must attend an institute. Prospective teachers take a double major, for example, mathematics and physics. Pólya (1960), discussing mathematics education in Switzerland, emphasized the extensive subject-matter training of Swiss teachers.

Need for improved inservice programs for secondary-school teachers was emphasized by Brown (1960a), and some innovations experimental in nature were reported. "Continental Classroom" courses in mathematics provided important modern courses for teachers who need them, and also served as model courses for interested colleges. Gustad (1959) gave a complete analysis of the evaluation of the *Study on the Use of Science Counselors* of the American Association for the Advancement of Science (1957). Denmark (1959) showed how a junior college can help.

State curriculum studies, such as those of the Oklahoma State Department of Education, Oklahoma Curriculum Improvement Commission (1960), became important factors in inservice education. The use of National Defense Education Act (NDEA) funds in inservice education by the Department of Education in California, reported by Lindsay (1960), pointed a way to new developments under a revised NDEA. Hendrix and Sims (1960) described the UICSM teacher-training films, intended for both preservice and inservice teachers and showing actual learning experiences of children.

A new factor of great significance to research is use of teaching machines. Blyth (1960) told of experiences at Hamilton College in teaching logic by machine. Tulock (1958) projected new horizons in the preparation of mathematics teachers resulting from recognition of the importance of content study, knowledge of related industrial developments, all-college planning, and systematically planned programs throughout the career of the teacher.

Mathematical Preparation of the Elementary Teacher

Attention was given to appropriate course offerings for the prospective elementary teacher. Many state elementary-teacher certificate requirements do not include credit in mathematics. However, as colleges and universities develop better courses in mathematics for this group, more states will add such a requirement. In the NASDTEC-AAAS regional conferences, a four-semester sequence for elementary teachers entering college with only two years of high-school mathematics was approved by certification officers as well as mathematics teachers.

There was a trend toward courses combining mathematics content and method (American Mathematical Monthly, 1960a). As a part of the American Association for the Advancement of Science (1960) education project, Emory University mathematics and education staff are jointly planning, teaching, and evaluating a mathematics course. Similarly, Oklahoma State University is testing a way of motivating prospective elementary teachers of mathematics and science by student teaching in the junior year followed by additional work in content areas in the senior year.

Smart (1960) reported on a summer institute for elementary-school teachers and supervisors under National Science Foundation sponsorship. At the University of Maryland an experimental inservice program in mathe-

matics for elementary supervisors and teachers, making use of the junior-high-school materials developed at Maryland, is in progress.

John (1960) reviewed basic mathematical content needed by elementary teachers in preparing students to study successfully the new mathematics courses at the secondary-school level. Analysis of topological ideas by Anderson (1960) relevant to the new junior-high-school mathematics supported John's view.

A number of colleges investigated inservice education projects for elementary teachers. Osborn and DeVault (1960) revealed enthusiastic acceptance of such projects by teachers when the mathematical content is closely related to teaching problems.

A new dimension in the preparation of elementary teachers is now clearly on the horizon, due to the increasing trend in elementary-teacher-education programs to require a major or area of concentration and to the new interest in the use of special teachers before grade 7. The American Association for the Advancement of Science (1959) is carrying on a study on the use of special teachers in science and mathematics in grades 5 and 6 in Cedar Rapids; Lansing; Washington, D.C.; and Woodford County, Kentucky. The research design includes tests of social attitudes and general intelligence as well as pretests and post-tests of achievement. A similar investigation known as the Dual Progress Plan is under the sponsorship of New York University.

Certification

The working papers for the 1960 conference of the National Commission on Teacher Education and Professional Standards, in the June 1960 issue of the *Journal of Teacher Education*, provided basic information for research and understanding of teacher certification as a complex component of the total teacher-education process. Stinnett (1960) found that all states now require a bachelor's degree for the beginning secondary-school teacher and all but eight require this minimum for the beginning elementary teacher. The range of required semester hours in professional education was from 12 (Arkansas, Maine, Massachusetts) to 27 (Washington). The modal requirement is 18 semester hours. Umberger (1960) reported an increased concentration in subject-matter-major content from a minimum of 15 hours to 30 hours in Connecticut, reflecting a widespread trend. Many states are revising certificate requirements (in mathematics and other subjects) upward in view of needs for teaching the new courses in mathematics and in answer to criticism.

The NASDTEC, with the co-operation of the AAAS, embarked on a cooperative study with scientists of what prospective secondary-school teachers of mathematics and science should learn about their subjects in college. Viall (1960) reviewed the process of the study and pointed out the participation of leaders of current curriculum studies. Young (1960), a participant in one of the regional conferences, spoke encouragingly of

the hope for improvement which should result from closer working relationships among mathematicians, teachers, and state-department personnel, and the impetus the study might give to state action research.

The use of proficiency examinations for teachers is a subject of debate in both academic and professional-education groups. Reference to this debate appeared in a short statement, "Proficiency Examinations for Teachers" (American Mathematical Monthly, 1960c).

Need for Further Research

Research in learning and teaching has developed rapidly. Further research recommended by the Woods Hole Conference (Whaley, 1959) includes reference to inherent interest of materials taught; providing for student discovery; writing materials "into the thought forms appropriate to the child"; use of films, TV, recordings, and teaching machines; the nature of intuitive thinking and analytic thinking; and the role of structure and principles in learning. In the near future we can expect to see textbooks which are fundamentally "teaching machines." Extended research in classroom use of such materials is necessary to ensure proper teaching methods and procedures. Kinney (1958) pointed out the need for evaluating the curriculum in terms of the following criteria: whether it can be taught, whether it should be taught, social validity, relation to total program, and articulation.

Research on methods of instruction, improvement of teaching aids, and learning will be highly significant for teacher education. In addition we need to know a great deal more about special courses for teachers, sequences of courses for teachers, bases of motivation and the relation of the inspirational teacher to the learner, identification of teaching ability, and bases for approval and certification.

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CHAPTER VII

The Teaching of Science at the College and University Level

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RESEARCH in college-level science education has increased greatly in the last 15 years. Reviews sponsored annually by the National Association for Research in Science Teaching in co-operation with the U.S. Office of Education and by the science-teaching societies affiliated with the American Association for the Advancement of Science present summaries of research at all levels, including college.

Teaching Methods

Frings and Hichar (1958) compared three laboratory teaching methods: (a) the "regular" method, using a manual in which identification and description of structures were illustrated by diagrams; (b) use of unlabeled diagrams and accompanying lists of structures; and (c) study of living specimens identical or related to those used in the other two procedures, with suggested experiments and questions. The students were given the same lectures and were divided into five laboratory groups, four of which were rotated as control (the "regular" laboratory method) and experimental.

Results of all methods were closely similar, and the results of a student methods-evaluation questionnaire were inconclusive. In deciding what method should be used, the major consideration, the investigators concluded, should be the interest, convenience, and preference of the instructor. This carefully planned and executed study bears out what has been indicated by other studies of this type: no one method of instruction, in and of itself, is better than others. Success is dependent on the instructor and what he does.

Breukelman, Andrews, and Novak (1959) reported a study in which three biology sections taught in a large lecture group without laboratory were paired with three taught in smaller lecture and laboratory groups. This study was carried on with successive groups of students over a three-year period. Each year the checks on the entrance tests of ability of the groups revealed no significant differences among them in any year or over the three years.

There was no evidence that students taught by the lecture-only method varied significantly in achievement from those taught by the lecture and laboratory method. Also there was no evidence of differential learning for the high, middle, and low-performance groups. Correlation coefficients between entrance examinations and performance in general biology were

relatively constant under both methods of instruction, though none were high.

The investigators concluded that (a) the lecture-only approach was apparently effective in teaching facts and principles; (b) lectures must be carefully planned and executed; (c) a greater proportion of staff hours must be allowed for student conferences; (d) audio-visual aids and distribution of lecture outlines, study questions, and diagrams are needed. Furthermore, it must be recognized that not all instructors are effective in teaching large lecture classes. They recommended further study of the effect of the lecture-only method on attitudes, ability to solve problems, and retention and understanding of biological concepts.

Lawson, Burmester, and Nelson (1960) described the development of a semi-automated teaching device called a "scrambled book." It is essentially a self-administered objective test, with accompanying addenda telling why each possible answer is right or wrong, with the whole arranged like a botanical key, telling the student where to go for the next step or alternative. Then the entire instrument is "scrambled" so that items and explanations do not follow in orderly sequence. Since the device is self-explanatory, it enables a single instructor to oversee the work of large numbers of students. The scrambled book requires that the student learn new ideas, and that he use these ideas in test situations frequently involving deductive thinking. It is a device that demands careful thought. It immediately checks and corrects errors.

The scrambled book used in this experiment replaced one week of introductory material in genetics. To construct it, a laboratory study of question-answer type was rewritten, carefully fitting each question with multiple-choice alternatives chosen either on the basis of previous experience with the unit or, if they were new questions, from students' free-response answers to a special test administration. No step in the thought sequence was omitted.

Five sections of the natural-science course at Michigan State University, using the device, were compared with five control sections on an objective test covering reasoning, analysis, and interpretation and application to new situations of what had been learned. Difference in performance was significantly (1-percent level) in favor of sections which had used the scrambled book. Questionnaire results indicated that the number of students who accepted the scrambled book and found it stimulating far exceeded those who did not. Staff comment was also favorable.

Research investigations dealing with college laboratory programs are few. Hilton (1957) proposed (a) to evaluate a laboratory program accompanying a college physical-science course for non-science majors and (b) to test experimentally a method of selecting laboratory experiments which would provide desirable science-education experiences for general education. In connection with the first objective he employed six criteria for the preparation of 15 one-hour laboratory experiments validated by the judgments of four specialists in college physical science.

In students' questionnaire evaluation of these experiments, they indicated that the laboratory was valuable (76 percent); that it improved understanding of the lecture topics (85 percent); and that experimental problem solving, by which answers, to be acceptable, must be based on evidence, was illustrated (93 percent). The laboratory experience on "The Heavens" ranked first in interest and general-education contribution.

In connection with the second objective, similar techniques were applied to the topics of mechanics, heat, electricity, and wave phenomena. Four physical-science specialists rated experiments for each area as to how well they illustrated science principles determined by appropriate research techniques. The highest-rated experiment and the lowest-rated one were used.

Laboratory Group I, in addition to hearing lectures, performed the experiment which the specialists rated highest and which also illustrated the most principles; Group II, in addition to lectures, performed the lowest-rated experiment which also illustrated the fewest principles; Group III, the nonlaboratory group, received only the lecture course. All three groups were pretested and post-tested with an examination on science principles. *L*-homogeneity tests indicated that the three groups were of equal variability. Simultaneously partialing out the effects of ACE scores and pretests by a complete analysis-of-variance-covariance technique, Hilton found no significant differences among either the four topical areas or the three groups.

General conclusions were that in college physical-science courses for non-science majors (a) the opinion of students concerning the positive effect of laboratory is of questionable value where the objective results of experimental investigation indicate no statistical variation in knowledge of science principles among the groups which had lecture with laboratory and without laboratory; (b) a physical-science laboratory program is of little or no value in assisting students in understanding science principles; (c) because the laboratory program does not produce statistically better results as measured by the understanding of science principles, it is doubtful that any method of selecting the physical-science laboratory experiments could be identified as better than any other method. No evaluation was made of the value which the laboratory might contribute to the retention of knowledge of science principles and to the acquisition of scientific attitudes and of problem-solving skills.

Alterman (1957) determined the comparative effectiveness of two methods of presenting physics principles on the ability of college students to apply principles of physics to new situations. The control consisted of starting with a statement of a principle and then proceeding to illustrate and apply it—the deductive method. The experimental method attempted to develop a principle by demonstration and analysis of applications or situations before the principle was stated. The latter is presumably the inductive method.

Four nationally used tests showed no significant difference between the control and experimental groups on pretest. At the end of one semester of

physics each group took three tests: (a) a test of recall of facts in physics, (b) a test of ability to solve mathematical or formula-type problems in physics, and (c) a test of applications of principles of physics to new situations.

Statistical analysis of the data, using coefficients of correlation and a *t*-test, indicated that (a) the inductive method produced significantly better results only with students rating low on preliminary background tests and then solely on the test of application of principles to new situations; (b) the ability of students to recall facts and principles of physics is highly correlated with the ability to apply principles to new situations as well as with the ability to solve mathematical or formula-type problems in physics; and (c) the ability to solve mathematical or formula-type problems in physics is significantly but not highly correlated with the ability to apply principles to new situations.

In a somewhat similar unpublished study in general college chemistry, Stubbs (1958) concluded that (a) the superiority of the inductive over the deductive method is more apparent than real, and (b) the inductive method is more fruitful than the deductive method for training students in use of the scientific method of problem solving and procedure.

Teacher-Student Relationships

Sturgis (1960) described an investigation to determine the relation of teaching effectiveness to the teacher's knowledge of the student's personal background. Based on two criteria, student ratings of the teacher and student achievement, it involved six groups of students in sophomore physics (mechanics) and three teachers. Each teacher taught an experimental section and a control section; for each student in the experimental section the teacher had a transcript of the secondary-school and college record and a personal data questionnaire filled out by the student. At the end of the course, all the students rated the teachers, using the *Georgia Tech Faculty Evaluation Form*. Achievement of students was measured by the mechanics section of the *Cooperative Physics Test for College Students*.

Analysis of variance showed that the students in the experimental sections rated their teachers significantly higher and made significantly greater gains in test performance than those in the control sections. It was concluded that the effectiveness of teaching, as measured in terms of student achievement and student ratings of teachers, is to a significant extent dependent on the teacher's knowledge of the student's personal background. This study appears, therefore, to lend some support to the contention that in large classes, where the teacher is less able to know the students as individuals, less effective teaching takes place.

Blumenthal (1957) compared end-term achievement of general college physics students who had been taught in lecture, recitation, and/or laboratory by one instructor with the achievement of those who had more than one. Group I ($N=49$) comprised students who had one instructor for all

three two-hour instruction sessions; Group II ($N=25$) students had the same instructor for recitation and laboratory, but a different lecturer; Group III ($N=85$) students had different instructors for the three sessions. The criterion was a carefully constructed two-hour examination testing physics knowledge and problem solving in the fields of mechanics, heat, and sound. The semester's achievements of all the students (including the experimental Group I) for the three instructors involved were compared on the criterion test. Since no significant differences were found, the instructors were presumed equally effective teachers.

Using Snedecor F -ratios of variance, Blumenthal found no significant differences in achievement among the three groups in problem-solving ability, but the end-term physics knowledge of those who had the same instructor in lecture, recitation, and laboratory exceeded that of those whose lecture and recitation instructors were different. There was no significant difference in end-term knowledge between those who had the same or different instructors in recitation and laboratory.

Scientific Thinking and Scientific Attitude

Bass (1959) studied the relationship between achievement on subject-matter tests in freshman zoology and two standardized critical-thinking tests: the *Watson-Glaser Critical Thinking Appraisal* and the *Test of Critical Thinking* of the American Council on Education. The *Ohio State University Psychological Examination*, the *Iowa High School Content Test*, and the *University of Oklahoma Mathematics Placement Examination* were also used. Zero, first, and second-order correlations and multiple correlation were computed.

Coefficients of correlation between the subject-matter examinations and the two critical-thinking tests were found to be significant at the .05 level. The ACE critical thinking test and the Oklahoma mathematics placement test were the best predictors, but were not markedly better than the other tests.

DeProspero (1957) undertook to determine if identification of the problem-solving skills portrayed in selected motion pictures would reinforce or develop an attitude of suspended judgment in college freshmen. Students from general-biology and general-science courses at Seton Hall University were divided into (a) an experimental group, (b) a film control group, and (c) a no-film control group. Three films were used: *The Scientific Method* (shown first to introduce problem-solving skills), *Madame Curie*, and *Yellow Jack*. A "Scale of Suspended Judgment" was constructed in the form of a series of statements of opinion and subjected to a Thurstone-type analysis by a panel of science educators. The final form of 20 items had an index of reliability of .88.

The experiment covered three consecutive class periods in which the no-film control group continued its regular class work, the film control group simply viewed the films, and the experimental group was made aware

of the object of the experiment and given some prior motivation. This group identified the problem-solving skills and answered specific questions concerning them. The *Scale of Suspended Judgment* was used in all groups as a pretest and post-test, and again six weeks later to test retention.

The experimental group and film control group showed a significant gain in the desired attitude, but the difference between them was negligible. The no-film control group showed little change. The change in attitude in the two groups using the films was not related to scholastic aptitude or ability to identify the problem-solving skills.

Honors Students and Future Scientists

Lehmann and Nelson (1960) and Lehmann (1960) broke ground in a field of great significance, that of the outcomes of teaching superior students. The students were enrolled in honors sections of the natural science course at Michigan State University. These sections were designed to provide superior students with a situation in which they would be associated in smaller groups with others like themselves, would have an opportunity to go beyond prescribed subject matter, and would not be graded on the basis of a prescribed curve. The studies sought to ascertain (a) what the students hoped to receive from the honors section; (b) whether there is a significant difference between honors students and regular students in pretest scores, post-test scores, ACE (intelligence) scores, or final examination scores; and (c) the students' reaction to the honors experience.

Samples drawn from four honors sections were compared with samples from eight regular sections. It was found that the honors students had a significantly higher final examination mean score on the pretest and also on the post-test. The honors students had a significantly higher percentage of A's and B's on the final grade, which was a combination of the instructor's grade (50 percent) and the grade on a common final examination (50 percent). Analysis-of-covariance adjusting for both pretest and ACE scores showed no difference in achievement on the final examination and revealed that the differences between instructors were the significant source of variation rather than the variation between honors and regular sections.

The results of student-opinion surveys indicated that the honors students were more concerned with thoroughness and understanding than with memorization. However, only 28 percent of the honors students said that they were highly stimulated to do better work as a result of being in an honors section, whereas 46 percent of the regular-section students said that they were highly stimulated by the standard version of the course. The follow-up study showed further that a higher-than-expected proportion of the honors students used the program as an avenue for acceleration. This was contrary to the purpose of the program. In the opinion of students, the awarding of grades to honors students constitutes a problem.

Strauss (1957), Strauss and Brechbill (1959), and Strauss (1960) performed three closely related studies which attempted to discover and describe a pattern of characteristics common to those who profit from higher education to the extent of attaining the doctorate, particularly in science.

In the first study Strauss investigated the backgrounds of 89 men who had all earned the Ph.D. in physics, chemistry, or engineering at the Ohio State University, the University of California at Berkeley, or Cornell University. The high schools they had attended were visited and their records studied. Faculty members who remembered them were interviewed. It was found that 38 percent of them had IQ scores of 120 or less, and only 26 percent had scores of 141 or more. If an IQ of 120 is considered minimal for expectation of success in college, 38 percent of these men should not have attempted college, much less graduate work. Similarly, though all were in the top 50 percent of their high-school graduating class, 25 percent were below the top 10 percent, and only 10 percent of them were in the top 1 percent.

If it is not superior intelligence or high scholarship that marks the background of the future scientist, what common factors are there? After studying the backgrounds of a total of 169 scientists (including an earlier study not reported here), Strauss made the following tentative generalizations: (a) They possess to a unique degree the characteristic of "drive," which in a surprising number of cases could be correlated with some type of frustration in their early lives. (b) They indicate a certain degree of nonconformity which showed up early in life. (c) A third important factor appears to be encouragement by an adult.

The second study involved 30 biological scientists and 30 social scientists, all recent Ph.D.'s. A carefully structured interview technique was used and the interviews were recorded, transcribed, analyzed, and categorized. The chi-square technique was used to compare the two groups for each of the characteristics studied. The findings were essentially the same as those of the first study. A statistically significant difference was found to exist in the case of only 17 percent of the characteristics, which led the investigators to conclude that most of the traits studied were common to both groups.

The third study examined the backgrounds of 648 Ph.D. graduates of Johns Hopkins and the University of Maryland by means of a questionnaire sent to their high schools. There were 170 graduates in the biological sciences, 295 in the physical sciences, 107 in the social sciences, and 76 in the humanities. No study of their personal backgrounds was included, but the findings as to their IQ level were essentially the same as in the first study.

Principles of Science

Blanchet (1957) summarized work done on defining principles of various fields of science. Since studies of this type up to 1957 numbered more than

50, this summary is valuable and to a certain extent definitive. The following categories were used to include principles studied: (a) refinement of statements of principles, (b) formulation of lists of principles in different subject-matter fields, (c) evaluation of principles in terms of course content, (d) activities which contribute to development of understanding of principles, and (e) association of principles in one field with those in another.

Blanchet believed there is an ample number (more than 3000) of principles of science for use by textbook writers, teachers, and curriculum makers; and that there are many learning activities which can be used for developing understanding of these principles. He saw need, however, for refinement, and need for a set of criteria generally accepted as definitive for a principle of science. Principles need to be categorized as (a) large and inclusive or (b) subsidiary. The evaluation and refinement of principles need to be extended to include their ramifications in terms of classroom application and the dynamics of living.

Television

A chapter would be required to abstract recent studies which include the teaching of college science on open-circuit and closed-circuit television. Phrases such as "findings of no significant differences in achievement between students taught by television and those taught conventionally" were typical. However, these should not be interpreted to mean that there is no loss when a class is taught by television rather than in person. Television seems to be slightly inferior to conventional instruction in most college situations.

Summary

It must be realized that a limited treatment of the only sort possible within a chapter cannot survey or adequately recognize many fine research studies in college-level science education published during the last four years. We have selected a few which are outstanding in content and execution, or which sum up an area or break ground in a new area of importance.

It should be noted that at least one very important area of college-level science education has been left untouched for lack of objective research studies. That is evaluation of the quality of graduate-level science education achieved in the institutes supported by the National Science Foundation. In view of the rapid growth of these during the last four years and the increasing role played by them in the graduate programs of most university-level institutions, such evaluation should be undertaken.

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CHAPTER VIII

The Teaching of Mathematics at the College and University Level

GILBERT ULMER and DONALD TILLOTSON

THE LAST few years' unprecedented interest in improving the teaching of college mathematics is evidenced by reports in the *American Mathematical Monthly* of papers presented at section meetings describing new programs and by conferences and symposiums on undergraduate mathematics throughout the country. A greatly increased number of articles, a nationally televised course with a new kind of content, and the activities of such groups as the Committee on the Undergraduate Program in Mathematics, the Division of Mathematics of the National Academy of Sciences—National Research Council, the American Association for the Advancement of Science, the American Society for Engineering Education, and the Conference Board of the Mathematical Sciences give added proof of interest in the field.

The actual research reported is almost insignificant in comparison with those activities. As yet there has been almost no scientific study of the need for change in the content of the college curriculum or the effectiveness of any of the new curriculums. This is not to say that changes should not be made until the need for them is established or that new curriculums should not be continued unless their worth is clearly proved. Sufficient reason for change lies in the fact that mathematicians from universities and from industry agree that much of the mathematics developed in recent decades is important and useful, and should replace parts of the classical curriculum.

Little formal evaluation has been made of special provisions for superior students. Again, perhaps the benefits of enriched programs are so obvious that evaluation seems superfluous, or perhaps it would be difficult to design significant research in this area.

Teachers and Method

Two studies dealt with the teaching of college mathematics. Gavurin (1957) studied professional characteristics of teachers (a) in the 25 oldest colleges in the United States during the years 1888-1941, and (b) in a recent sample of 117 colleges of various sizes and types of organization. He found a range of training and professional activity in teachers in the latter group which tended to vary with the size and program of the college in much the same way as these factors varied with time in the former group.

Woo-Sam (1960) attempted to discover personal factors in teachers related to their teaching effectiveness as measured by student achievement. He found no factors on the scales used which varied significantly with such effectiveness. He also found no significant improvement in effectiveness as a result of counseling by a superior on the basis of the results of a student-rating scale.

Cummins (1960), experimenting with emphasis on student experience and discovery, prepared study guides and conducted class discussion so as to enable students to develop the concepts of the calculus for themselves. Comparison of the achievement of the experimental classes with control classes taught conventionally by another instructor indicated no significant differences in problem solving and skills but greater understanding of meanings.

Prediction and Placement

A problem in many colleges is accurate identification of students who may profitably begin their study of college mathematics with analytic geometry and calculus. Knights (1957) used the recognized techniques of test construction to develop and standardize an instrument for predicting success in analytic geometry. Also studying analytic geometry, Miller (1960) found that a combination of high-school average and scores on a trigonometry test had a predictive coefficient of .35.

Corotto (1958) found that both the *ACE Psychological Examination* and a locally constructed screening test would distinguish at a significant level between potentially successful and potentially unsuccessful students in their first mathematics course at the University of Houston. The screening test proved to be the better predictor. Schmidt (1958) found significant relations between scores made by entering freshmen on a junior-high-school mathematics test and their achievement in a general-mathematics course and in all courses at Florida State University. One measure tabulated was the ratio of credits earned with A or B grades to those with D's or F's for all students who scored in a given tenth of the test norms.

Graybeal (1958) considered interest inventories and biographical data as well as intelligence test scores and high-school averages in prediction of performance in college algebra. The predictive value of the data varied according to which of the following criteria was used: (a) achievement as measured by a standardized test or (b) success as indicated by the instructor's grade. Stone (1957) used the Wherry-Doolittle method to develop a multiple-regression equation to predict four-year averages in mathematics, physics, and chemistry. The significant variables were scores on the *ACE Psychological Examination*, one part from the *Minnesota Personality Scale*, two scales from the *Thurstone Temperament Schedule*, and the mechanical part of the *Kuder Preference Record*. The mechanical-interest score had a negative relation with the criterion. Riffenburgh

(1960), using a projective technique, did not find significant differences in personality traits between high achievers and low achievers in college algebra.

Attitudes

Cristantiello (1959), using a scale developed by Silance to measure the attitudes toward mathematics of college sophomores in business, social science, and science curriculums, found the majority to be favorable. The *Edwards Personal Preference Schedule* was used with students expressing extreme attitudes in an attempt to identify traits correlating with these attitudes. With the business and social science groups no such traits were found. With science students, favorable attitudes tended to accompany high scores on the endurance and achievement scales, and unfavorable attitudes correlated with the succorance and nurturance scores.

Tape-recorded interviews with students professing a fear of mathematics and with some high achievers were compared by McDermott (1956) in a study of possible causes of such fear. Dreger and Aiken (1957) established evidence of the existence of a "number anxiety" distinct from general anxiety by means of a modification of the *Taylor Manifest Anxiety Scale* and measurements of galvanic skin response.

Curriculum

During the period included in this review the undergraduate mathematics curriculum was the subject of much discussion and revision, which, however, involved relatively little formal research. Means (1958) submitted a list of 73 possible objectives for freshman and sophomore mathematics courses to a jury of experts and to mathematics teachers in seven Texas colleges. The agreement of the two groups in their over-all ratings of these objectives was evidenced by a correlation coefficient of .78. Means then sought to evaluate the extent to which the objectives recognized as valid were being realized at these colleges. To do this he examined catalogues, course outlines, and examinations from the institutions and administered a special test to a sample of the students.

In this study, certain objectives were criticized by some evaluators as properly being the concern of the high school rather than of the college. This agrees with the actions of some institutions in discontinuing remedial courses. Corotto (1958) found that students who took a remedial course were not significantly more successful in the next mathematics course than students of equal ability who had omitted the remedial course.

For terminal students in junior colleges, Rowe (1957) found that a course based largely on socialized arithmetic and elementary algebra with attention to the role of mathematics in the world today produced gains in mathematical achievement over that of students in a course in business mathematics or not enrolled in a mathematics course. A study of needs

and objectives led McNair (1959) to contend that one year of mathematics should be required of all junior-college students.

Layton (1957) found that of 91 colleges reporting a general-education program, only 46 required some mathematics. For the 91 institutions, the range in the amount of required mathematics was zero to eight hours, with a mean of 1.97. The mean number of hours of mathematics considered advisable by the respondents was 4.82. Agreement on topics desirable in such a required course centered on items from arithmetic and algebra. Milligan (1961) established objective criteria for validating topics in freshman mathematics and used them in constructing such a course. Changes in the calculus course during the present century were mapped by Mitchell (1958) from committee reports, college catalogues, and textbooks. New directions seemed to be established in 1910 and 1940.

In two matched classes of solid analytic geometry Pettofrezzo (1959) used the vector approach in one, the algebra of numbers in the other. A special test, previously validated, revealed no significant difference in achievement between the groups. Of perhaps greater importance might have been the ability of the groups to understand vector concepts in later courses.

Mathematics for Special Curriculums

By means of a least-squares technique, Horton (1959) arrived at a sequence of topics in freshman mathematics for engineers most closely matching the order of topics in nine texts. This was one part of a study of the reorganization of such a course to promote the formation of concepts. In his conclusions, he emphasized unification around the function concept, with intuitive presentations preceding formal developments.

Prentice (1959) identified the mathematical definitions and theorems involved in the study of electrical engineering, organized them in a complete logical development, and outlined a corresponding sequence of three year-courses. Ahmann and Glock (1959), comparing the achievement of agriculture students assigned to a special freshman mathematics course with that of an equal group not taking the course, found no significant difference in grade-point averages or marks in later mathematics courses between the experimental and control groups, perhaps because of the exposure of all students to some mathematical instruction in science courses. In immediate persistence and in gain in mathematical knowledge during the freshman year, data favored the experimental group.

Two projects involved the mathematics curriculum for students of the behavioral sciences. Becker (1959) outlined a course for sociology and economics students after seeking to identify the essential concepts. The Dartmouth College Writing Group (1958), under the direction of the Committee on the Undergraduate Program in Mathematics of the Mathematical Association of America, prepared two volumes of experimental test materials for a second-year mathematics course emphasizing topics useful

in the social and biological sciences. Programs for students preparing for positions in industry were studied by Hart and Wood (1959) by means of a rating scale. Head mathematicians in large firms indicated their opinions of the value for training applied mathematicians of the courses commonly offered beyond the calculus.

Programs for Superior Students

Honors sections of mathematics courses continued to challenge superior students. At Princeton, the program was extended to the junior year, whereas at Dartmouth, three "tracks"—standard, honors, and social science applications—were continued through all four years. May (1958) reported that a small honors group at Carleton College engaged in projects during the fourth semester after completing an enriched version of the freshman and sophomore courses in three semesters.

Other programs, not yet subjected to formal evaluation, were the independent-study plan required of all students at the College of Wooster (1958), culminating in a senior paper and a comprehensive examination; the undergraduate thesis at Reed; the College of Quantitative Studies at Wesleyan, where one-fourth of the student's time is devoted to projects and problems; undergraduate research programs as at Carleton College and the University of Kansas; and a course presented by a distinguished visiting lecturer at Haverford.

Organization for Large Enrollments

Increased enrollment in mathematics and lack of a comparable increase in number of competent instructors led to experiments in course organization. A desire to bring as many beginning students as possible under instruction of master teachers suggested such measures as large lecture classes, films, and television.

Two investigations of class size in elementary college mathematics, both conducted in Kansas, yielded conflicting findings. Notheis (1958) discovered no significant difference in achievement as measured by a standardized test between large and small classes at Kansas State Teachers College. Evidence based on class marks was in favor of smaller groups in a study by Simmons (1958) of classes at the University of Wichita. In each case large sections in 1956-57 were compared with smaller classes of the year before, with proper consideration given to possible variations in ability factors.

Films and Television

The importance attached to the use of films and television was indicated by the appointment of a Film Evaluation Board by the Advisory Board

on Education and the Division of Mathematics of the National Academy of Sciences—National Research Council (1957). Developments in the use of these media were reviewed by P. Jones (1958) in an issue of the *American Mathematical Monthly* largely devoted to articles on this topic.

A number of studies of the use of televised lectures revealed no significant differences in mean achievement between "video" and "nonvideo" classes. King (1959) used a conventionally taught class of a previous term for comparison. Other studies, by A. Jones (1958), Larney (1959), Gordon, Nordquist, and Engar (1959), and Allendoerfer (1958) used regular classes during the same term as controls. Benner and Rogers (1960) compared achievement with that of the norm population for a standardized test.

In most experiments, small discussion sections were held to supplement lectures; but in the investigations of Seibert (1958) and A. Jones (1958, 1959), the students met in classroom groups for a one-half-period lecture and remained for a discussion session led by an instructor. Dyer-Bennet and others (1958) reported the use of matched pairs of students in comparing achievement in video and large lecture classes in calculus. Another control used was the exchange of lecturers between the two groups at mid-term. Only Elliott (1958) reported superior achievement by television classes. However, the closed-circuit lectures were later replaced by conventional lecture to a large class, in part because much of the improvement was attributed to the emphasis on self-reliance and careful preparation of assignments.

There was some evidence in the study by Gordon, Nordquist, and Engar (1959) at Utah that high-ability students achieved better with televised instruction and lower-ability students better in the classroom. However, a similar analysis by Dyer-Bennet and others (1958) at Purdue did not reveal significant differences. The reports of Elliott (1958) and Allendoerfer (1958) mentioned the effect on the general public of mathematics courses broadcast over educational stations. The presentation of expertly prepared courses in contemporary mathematics on the "Continental Classroom" series will probably be the basis for future research studies.

A different approach to effective use of faculty was tried at Oberlin, where a long period of independent study was inserted in the middle of a year course. Baum (1958) reported that the experimental group did not evidence inferior achievement on course content to that shown by a control group which attended class all year, and that scores on a special test of "learning-resourcefulness" favored the independent study group, although not to a significant degree.

Programed Instruction

It is expected that there will soon be a number of reports of the effectiveness of programed materials and teaching machines. Several programs

have been written for college mathematics courses, but there has been no evaluative research.

Summary

Despite the vast amount of activity in the teaching of college and university mathematics, little research was reported. Studies were conducted in local situations, usually by individual investigators, over short periods of time. Co-operative effort on important problems is needed to be carried out on a national scale and over extended periods of time. Research is needed in methods of training new instructors and graduate assistants, ways of developing imagination and creativity in the study of mathematics, evaluation of new curriculums in the light of carefully established objectives, and the operation of advanced-placement programs.

Additional areas in which research might be helpful are ways of motivating the study of mathematics, the teaching of linear programming at various levels, desirable curriculums for small colleges, and further study of the use of large lecture or television sections with small discussion and problem-solving classes.

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CHAPTER IX

Provisions for the Academically Talented Student in Science and Mathematics

JEROME METZNER and WILLIAM B. REINER

RECENT reports regarding provisions for meeting the educational needs of talented pupils in science and mathematics dealt with new curriculums, courses of study, administrative provisions, and after-school programs. Few gave evaluation findings other than general or subjective estimates of the success of the programs undertaken. In some cases the programs were too recent for evaluation to be complete or they had not been fully reported. In others, no systematic ratings or statistical appraisals were undertaken.

Mention of a study here does not imply that its research quality is high. Citation is intended to serve only as a general guide to those interested. The first part of this chapter deals with the talented student in science, and the second with the talented student in mathematics. Most of the investigations noted here were conducted at the secondary-school level. Although provisions are being made for the talented at the college level, little research on such efforts exists.

Provisions for the Talented Science Student

To fulfill the special needs, abilities, and interests of talented science students, many programs and practices have been developed; and as they are tried, evaluative procedures will no doubt be developed also. The following practices were usually linked with carefully conducted guidance and counseling programs: advanced courses in high school, such as electronics, experimental biology, and instrumentation; ability grouping; acceleration; enrichment; advanced-placement courses; college attendance of high-school students; research-participation programs (sometimes summer programs); seminars (sometimes with technically competent resource people); trips to science and mathematics centers; special assignments, projects, and examinations; participation in fairs, congresses, and contests; scholarship talent searches; special programs of independent study; science and mathematics student institutes; apprenticeships to practicing scientists and mathematicians; honors classes; tutoring by talented students; foundation programs (e.g., Joe Berg Plan, National Science Foundation); extra programs; special summer camps; improved teacher-education programs; block programing; television and film courses; early admission to college.

Provisions for the Talented in Elementary-School Science

Experimenting with teaching science to the intellectually gifted in four New York City schools, a teacher-specialist conducts a science program in 10 classes while the regular teacher remains in the room to establish a "carry-over" and a "team approach." This experiment, to be carried through 1963, will attempt to determine the effect of this special science instruction on the achievement of children in other areas and on the attitudes of the classroom teacher. No evaluation or progress reports are available.

Davis and others (1960) constructed a battery of tests designed to measure the mental characteristics of young gifted children which included the investigation of five basic skills: scientific knowledge, space conceptualization, vocabulary, number ability, and reasoning. The science test was conceived as having value in programs attempting to detect science giftedness at an early age. Findings indicated that the five intellectual abilities are only loosely related to one another but that they can be accurately measured in children as young as four to five years of age and that children gifted in one or more of these abilities can be identified.

Norris (1958) pointed out that certain principles seem to be common to most administrative procedures in caring for the gifted child: (a) There is little or no acceleration; enrichment predominates. (b) Separation of the gifted from the group is indicated as desirable, if only for short periods. (c) The earlier the gifted child is challenged, the better. (d) Subject matter is not as critical as building interests, habits, and attitudes. (e) It is wise to cater to strengths and special abilities. (f) It is important to find and develop special talents. (g) Parents' co-operation is essential.

Passow (1959) emphasized the need for opportunities at an early age for individual searching leading to reflection and discovery. The elementary science program can be enriched by (a) differentiated assignments which encourage depth of activity, (b) group projects which deal with topics at an advanced level, (c) extended materials commensurate with the learner's abilities and desire to delve deep, and (d) opportunities to work independently with difficult materials.

Simpson and Martinson (1961) listed several evaluative studies of the achievement of gifted elementary pupils in science. In general, brighter students made greater advances in a given year than did average pupils, judged by standardized test results.

Provisions for the Talented in Secondary-School Science

Schaefer (1958) described an advanced science course for gifted students in high school which included college topics, such as the use of the slide rule and the development of physical theories. Fetherston (1959) reported a summer honors program for young scientists in Michigan. The

course utilized seminars, field trips, and resource people. No evaluation had been completed at the time of this report. Summers (1957) provided experiences in college-level chemistry for gifted high-school students. Nine of the 13 who took the Advanced Placement Examination were successful in obtaining advanced standing. Norton (1959) described successful enrichment activities for gifted students in high-school science, including assignments of additional problems and exercises, special science clubs and organizations, state and national contests, and extended library services.

Waterman (1957) described the National Science Foundation (NSF) program in relation to teacher training, student-participation programs, curriculum development in improving science teaching, and providing better facilities for the gifted student in science and in mathematics. The foundation program is available for high-school as well as college teachers in science and mathematics.

A description by the University of the State of New York (1958) of 56 practices for gifted pupils in the secondary schools of New York showed many specific programs and practices currently being used in the teaching of science and mathematics.

Crandall (1959) edited a study involving two matched chemistry laboratory classes for academically talented students. The control group participated in laboratory work in the traditional manner. The experimental group used open-end experiments with stress on developing scientific reasoning ability, creative thinking, and scientific outcomes other than factual knowledge. No significant differences between the groups were found in results on (a) a test of science reasoning and understanding, (b) a test of critical thinking, and (c) a high-school chemistry test.

In 1959-60, as part of a program still in progress, 24 New York City schools offered advanced-placement courses to 2366 students, of whom 592 took the Advanced Placement Examination; 498 passed. The greatest number of pupils were enrolled in mathematics (813); chemistry (494) ranked second. Expansion of advanced-placement courses is being encouraged where special abilities of teacher and pupils make it possible.

Sams (1960) reported the use of rating scales by California high-school principals to appraise procedures for gifted science students. The criteria rated highest were individual encouragement and personal guidance, opportunity for enrichment and advanced study, and self-evaluation.

The Worcester Foundation, in co-operation with St. Mark's School (Massachusetts), has held nine-week summer programs for talented pre-college students since 1955, aided by NSF funds. The programs have effectively motivated students into science teaching and medicine. Cooley and Bassett (1960) evaluated the Thayer Academy (Massachusetts) summer program, in which talented eleventh-year students studied for two weeks at the academy under visiting scientists and professors. During the next eight weeks these students worked in industrial and university laboratories under the supervision of specialists and attended a weekly sem-

inar. The program produced considerable growth in their ability to screen hypotheses, interpret data, and reason quantitatively. Summer programs for gifted high-school science students were regarded as successful. Paschal (1960) described several such programs in science and mathematics.

Brandwein (1958) listed some secondary-school provisions for the gifted in mathematics and science, such as differentiated grouping, assignments, and texts; laboratory work beyond the required exercise and opportunity for individually conceived experimentation; and differentiated tests with scope beyond classwork. Differentiated grouping and differentiated organization utilize clubs, laboratory squads, tutorial groups, seminars, special lectures, and homerooms for students planning to specialize in mathematics or science. The school-within-a-school or honor school is another device for obtaining free play of aspiration in a uniform administrative organization.

Bish and Gilliland (1960) recommended curricular and administrative guidelines for supervisors seeking solutions to such problems as articulation, identification procedures, programing, evaluation, and community relations. The principal's role in developing the program was elaborated.

Current efforts to upgrade secondary science include modernization and reorganization of science courses to emphasize principles, broad generalizations, and conceptual frameworks. Technological and applicational objectives have been minimized. Laboratory work is oriented toward experimental, problem-solving approaches, rather than toward routine exercises whose outcomes are frequently obvious. Foremost among these efforts were those of the Physical Science Study Committee, the Biological Sciences Curriculum Study, the CHEM Study, and the Chemical Bond Approach Project.

Bristow and others (1958) pointed out the need for proper revision of course content and grade placement in physics, chemistry, and biology. They cited procedures used by the Physical Science Study Committee at Massachusetts Institute of Technology, which included simultaneous involvements of scientists and science teachers in developing learning units, tryout of the materials in classroom situations, and the training of teachers. The AIBS Biological Sciences Curriculum Study (1961) prepared an experimental volume of 100 "biological investigations for secondary school students," contributed by biologists, which are intended to meet the needs of teachers working with students of high ability and interest in biology.

Learning materials better suited to the abilities of gifted students were produced. Science textbooks for high schools were brought up to date and presented newer concepts, such as the bond theory in chemistry and advanced energy relationships in physics. More pure science and critical thinking were included in proportion to descriptive and utilitarian science content. Barnes and others (1958) developed criteria for selecting supplementary reading books in the sciences for gifted high-school students and assessed the relative importance of these criteria. A survey of the

literature yielded a list of 23 criteria. Questionnaire respondents ranked these criteria and suggested others which should be included. The criteria were then divided into those pertaining to the effect of the book on the reader and those pertaining to the intrinsic quality of the book. A list of 12 criteria for supplementary reading in science books for gifted high-school students was set up and recommended for use in upgrading the reading level of this group.

Provisions for the Talented Mathematics Student

The most common provisions for mathematics students were curriculum adjustments in which modern concepts, greater concentration of materials, and critical thinking were stressed. The following are being studied: (a) curriculum development, scope, sequence; (b) new materials; (c) teacher training; and (d) redesigning of teaching methods. Few reports, however, include evaluative statistics as to outcomes, since most of the programs are in early stages. They follow the pattern of those for science students.

Provisions for the Talented in Elementary-School Mathematics

The Kalamazoo (Michigan) Public Schools (1958) described provisions for gifted pupils at elementary and high-school levels in science and mathematics. Curriculum materials, methods of teaching, and pupil achievement were reported. The program, in the light of pupil achievement on several tests, appeared to be successful. Kough (1960) described basic administration of mathematics and science programs for gifted children: (a) enrichment; (b) grouping in specialized schools; (c) special classes; (d) honors courses, seminars, and special courses; (e) out-of-school activities; and (f) acceleration.

Simpson and Martinson (1961) described in detail 17 programs developed in various learning areas for students at all levels. In formal arithmetic processes, children in programs at the lower elementary level advanced two years over regular pupils in the same period of time. The University of Illinois Arithmetic Project (1960) is currently developing and testing units on special topics in Champaign-Urbana public schools and elsewhere for kindergarten classes and in grades 1 through 6. Although not specifically designed for gifted pupils, the project has many potential applications for them. New topics, such as informal geometry, are being introduced at the elementary level.

Provisions for the Talented in Secondary-School Mathematics

A number of programs for gifted secondary-school mathematics students were described. Dodes (1959) discussed the program at the Bronx High School of Science (New York), where courses on the electronic computer,

such as the IBM 650, are being taught; and Kieffer (1959) reported on the advanced-placement plan in the Cincinnati schools. Freese (1959) considered introducing college mathematics in the senior year of high school. Passow and Brooks (1959) discussed the identification of talented secondary mathematics students and proposed a curriculum for them.

A program for advanced students in mathematics, grades 10 through 12, was formulated by the National Council of Teachers of Mathematics, which, in conjunction with the National Education Association Project on the Academically Talented Student, published material including provisions for mathematically talented students (Vance, 1957). Fliegler and Bish (1959) reported several studies describing enrichment and modernization in grades 9 through 12. More courses were completed with high grades in less than normal time by the gifted.

Evaluations of pilot programs in Milwaukee Public Schools (1960) indicated that it is possible for superior pupils to complete the three-year mathematics sequence of grades 7, 8, and 9 in two years. Selected pupils entering grade 8 are ready for tenth-grade geometry. The accelerated tenth-grade mathematics class showed higher achievement over normal on tests in both intermediate algebra and plane geometry than did either the tenth-grade or the eleventh-grade control group.

The University of Illinois School Mathematics Program (1961), directed by Max Beberman, has produced instructional materials, developed teaching methods, and trained teachers in secondary-school mathematics since 1951. Much of the program has appeal for gifted children. The committee has three major theses regarding methodology: (a) There should be consistency in approach. (b) Pupils are interested in ideas. (c) Manipulative skills and understanding are complementary. The program has developed six units of instruction and plans five more in the near future. It operates in several high schools in Illinois, Massachusetts, and Missouri.

Lloyd and others (1958)—mathematics committee of the Invitational Conference on the Academically Talented Secondary School Pupil—made favorable reference to the exploratory programs conducted at the University of Illinois; St. Paul, Minnesota; Hunter College High School, New York City; Arlington, Virginia; Lincoln and Central High Schools, Philadelphia; Portland, Oregon; Montgomery County, Maryland; and the University of Maryland. They saw schools moving toward compressing algebra, geometry, and trigonometry into three years for gifted students in order to make provision for calculus in grade 12.

Needed Research

Evaluative research is needed to determine whether or not the present practices in science and mathematics programs for gifted students have been instrumental in realizing educational objectives. It is recommended that intensive studies be conducted on outcomes other than scholastic

achievement. For example, how effective is the program for the gifted in stimulating and nurturing creativity, critical thinking, and problem-solving ability? The administrative aspects need research analysis. For example, what is the most effective arrangement for laboratory work, size of classes, plans for pupils, independent and group study, cocurricular and extra-curricular activities, and grading? What teacher attributes are most effective in helping the gifted realize full potential? What training program is needed to produce the most effective teachers for the gifted? What are the classroom, laboratory, and field-trip group dynamics that promote optimum interaction among gifted students and between them and their teachers? Answers to these questions are needed.

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CHAPTER X

The Methodology of Educational Research in Science and Mathematics

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SINCE a large proportion of the research in methodology during this interval was described in dissertations, these constitute most of the reports reviewed here. This chapter is restricted to the procedures used in investigations. No attempt is made to deal with curriculums, teaching techniques, background, results, or conclusions of the studies.

Surveys

About two-fifths of the studies examined were surveys, most of which gathered data by questionnaire; not all were validated carefully, particularly in the matter of prior submission to a jury.

Opinions, Attitudes, and Interests

Aylesworth's (1960) study of science teachers' attitudes toward problem solving involved much preliminary investigation. Observations and tape recordings were made of 20 classes in schools of various sizes and in various science areas. A preliminary questionnaire was sent to 20 teachers, and their responses were compared with the tape recordings before the final questionnaire was formulated. Belt (1959), measuring attitudes of high-school pupils toward science and scientists, found the accuracy-of-perception items (multiple-choice) less ambiguous than the Likert type (agree-disagree-undecided).

Teacher Background and Teaching Conditions

Searching for factors contributing to competency of elementary science teachers, Berryessa (1959) used supervisors' identification of 100 outstanding female teachers, and chose the top 25 and bottom 25 (as evaluated by the Science Program Evaluation Scale) to be tested by interview, the *Kuder Preference Record*, and the *Minnesota Teacher Attitude Inventory*. Factors examined included childhood experiences, credit hours in college science, enjoyment of reading science materials, confidence in supervisor's

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ability, grades in science, teacher attitude (MTAI), stimulation, and interest in science and in teaching science.

A comprehensive survey of the academic preparation of science teachers was made by Pella (1958), who obtained the names of science teachers from state departments of education records, secured their college transcripts, tabulated data to show whether or not the teachers were part-time or full-time science teachers, categorized schools according to 12 sizes, and reported on areas of teacher preparation in physics, chemistry, biology, earth science, health, and mathematics.

A Canadian survey of the mathematical competence of prospective elementary teachers was made by Nelson and Worth (1960), who compared the trainees with their American equivalents at Illinois and Boston universities. Data on 468 trainees at various levels in the Alberta Faculty of Education were secured by means of the *Phillips Achievement Test in standings*, and by questionnaire for background. Comparison of Alberta and American means was made by use of the Cochran-Cox method involving weighted t -values, with no assumptions regarding population variance.

Norton (1960) surveyed teacher load in science and mathematics, making use of the Douglass definition of a teaching-load unit: teaching and preparing for an average class of 25 pupils for one period of 50 minutes (ordinarily 84 minutes of work). A formula yielded the number of teacher-load units per week.

Survey by Textbook Analysis

Content, objectives, materials of instruction, and programs were surveyed by means of textbook analyses. For example, Wilson (1959) traced and analyzed the evolution of plane-geometry content by examining 12 textbooks published in the United States between 1811 and 1837, 13 between 1838 and 1863, 18 between 1864 and 1881, and 18 between 1882 and 1899.

Psychological Bases of Learning

Surveys of factors, concepts, processes, learnings, thinking, and trends leading to achievement in mathematics and science have been made in a variety of ways. Miller (1960) obtained data from individual interviews in which a randomly selected group of 40 pupils thought aloud as they solved seven verbal arithmetic problems. Recordings were made of all responses. Jones (1959) analyzed excerpts of anecdotes in order to compose a list of beginning learnings which appeared to have resulted from "science experimenting to find out" by first-grade children. Stein (1960) surveyed the literature for changes in ideas regarding objectives, content,

method, teaching aids, and needed research in secondary-school mathematics.

Post (1958) used a confounded factorial design and analysis of variance in determining the significance of main effects and several minor-order effects of interaction of factors affecting the understanding of verbal problems in arithmetic. Factors included size of numbers, superfluous numerical data, familiarity of setting, number of steps, type of operation, and symbolic terms. Each factor was defined at two levels, making 64 different combinations in the study.

Status Surveys of Programs

Status-survey research provides data for comparative education. Faber (1960) used a survey team to visit Florida schools in order to observe provisions for high-school science. Lucow (1960) postulated a continuum ranging from laissez-faire to complete prescription of the elementary, junior-high, and senior-high science programs in Manitoba. Voss (1958) used questionnaire, personal visit, and interview to survey the status of science education in Iowa high schools.

Redfield (1960) made a comparative survey of programs, facilities, and staff of secondary-school science departments by use of a stratified random sample of four public schools in each of seven geographical strata. The procedure involved preparing the sampling design, inviting co-operation of the schools, visiting 57 schools for three hours each, interviewing administrators and teachers, and inspecting laboratory and library facilities.

Experimental Research

More than 26 percent of the studies examined were experimental. Few adhered to all the principles of replication, randomization, and control of variability as advocated by Johnson (1951). In still fewer were the assumptions underlying the statistical treatment adequately tested.

Gibb and Van Engen (1959) followed Johnson's principles when they drew a sample of fifth-grade children from 30 schools, divided them into three groups of 8 boys and 8 girls each, and provided three structured experiences individually for the children in helping each develop the mathematical idea of area. There was replication of treatment within each group. There was randomization in the selection of the sample, in the assignment to groups, and in the method of instruction for each child. Variability was controlled by restricting the IQ range to 100-110 and reading ability to equal to or greater than grade 3.5 and by other restrictions relating to location of school and homogeneity of classroom. The unit instructional scene included child, instructor, and assistant, with a tape recorder for all conversations. Analysis of variance was used extensively in comparing the results.

Anderson and Montgomery (1959) took care in testing assumptions by using normal-probability paper for showing normality and the Bartlett test for homogeneity of variance and regression, with the result that the analyses of variance and covariance that followed were on a sturdier foundation than is usually the case. Analysis of variance was used in analyzing pretest to post-test variance increases.

Two-Methods-of-Teaching Comparisons

Two methods of teaching the determination of the characteristic of a common logarithm were compared by Clebowicz (1958), who applied an extension of the Johnson-Neyman analysis to three matching variables. Graphs described three-dimensional regions or ranges of values for each background trait wherein the difference in achievement between the two treatment groups was significant. Clebowicz found the *time* element to be a significant factor in learning. Dearden (1959) also used the Johnson-Neyman technique for combining findings from six sections and thus compared the treatment groups for the experiment as a whole. Pretests, post-tests, and delayed post-tests were used.

Jensen (1958) compared two treatments using the same curricular content over a two-year period. Random samples were checked for equivalence in intelligence and in reading ability by use of a modification of the Welch-Nayer test for homogeneity of variances, and by analysis of variance for testing equality of means. Pupils were randomly assigned to classes for each year. Teachers were randomly assigned the first year, and they taught by contrasting methods the second year. This enabled an extension of the unrestricted randomized design to be used in setting up a three-way classification system for analysis.

Kuhnen (1960) used a rotation technique, each contrasting group being experimental for three weeks and control for three weeks, in assessing the effectiveness of field trips in the teaching of botany. Criteria for selection of areas for field work were established by a jury.

Nonparametric statistics were used in a science-film study by Popham and Sadnavitch (1960). Use was made of the Mann-Whitney *U*-test, the sign test, and chi-square. Schools were divided into two groups matched for grade organization, student enrollment, assessed-property evaluation, community population, type of accreditation, and number of full-time faculty members. Achievement was compared by analysis of covariance, holding constant pre-experiment achievement, grade-point average, and intelligence.

A Laboratory-Type Study

A transfer-of-training design was used by Ervin (1960) with 16 third-grade and fourth-grade children, whose problem was to predict the action

of a body on an inclined plane. A standardized verbal interrogation was conducted. Apparatus included a truck weight, a counterbalance weight, and a plane whose inclination could be varied. The children were trained in predicting the outcome of variation of two variables when the third was held constant, and then were tested on a second problem in which all three were varied.

Research Leading to the Development of Methods of Instruction and Courses of Study

About 17 percent of the studies dealt with proposed methods and courses in science and mathematics.

Jackson and others (1960) conducted five projects designed to increase students' independence in learning. The biology project sought techniques or devices that would enable students to design and conduct appropriate laboratory experiments with increased self-direction. A sample of 22 students aged 13-16 with IQ's above 100 were set goals, assigned tasks, and taught research techniques. The instructor acted as consultant and did some conventional teaching—all in five 56-minute periods and two field trips. The chemistry project, with the theme "The key to permanent learning is relatedness," was a two-year effort, the first year being devoted to developing materials and testing the hypothesis that self-dependence of students in the laboratory increases with a concurrent decline in the necessity for close supervision. Measurements of acquisition of facts and increase in self-direction were made in the second year. This experiment was reported by Westmeyer (1960).

Mitchell (1959) developed an integrated science course for nurses by drawing up a checklist of items in chemistry, microbiology, anatomy, and physiology. The checklist was submitted to nursing educators, curriculum consultants, junior-college instructors in these fields, and senior students in three schools of nursing. A shorter questionnaire was sent to graduates of the hospitals. Standard scores were derived to estimate the value of each item on the checklist.

Predictive and Correlational Studies

About 7 percent of the studies examined dealt with the relationship of an individual's characteristics to later achievement.

Oakes (1959) used the Wherry-Doolittle method to calculate multiple-regression equations in score form to predict the contributions of intelligence, interests, aptitudes, previous academic experience, reading level, and personality to the academic achievement of gifted seventh-grade children in an accelerated general-science curriculum.

Bradley (1958) used the IBM 650 computer with a multiple-regression program to estimate success in technical and skilled-trade courses. Output

included means, standard deviation, zero-order correlations, predicted scores, residuals, and standard errors of multiple estimate. The 42 variables in the initial phase were reduced to the three most independent ones in the final phase.

Cooley (1958) showed how the attributes of potential scientists might be discovered through the application of multivariate analyses (discriminant analysis, analysis of variance, regression, and factor analysis).

Historical and Philosophical Studies

At least 7 percent of the studies examined made use of historical or philosophical methods.

Carlton (1959), by historical analysis, determined the educational concepts of 14 outstanding mathematicians between 1790 and 1940, which emerged from their psychological, historical, and pedagogical viewpoints; their creative thinking in terms of habits and traits; and the role of symbolism in their thinking.

Philosophically, Obourn (1960) saw a crisis in science-education research because "we . . . persist for the most part in being content with incidental, piecemeal and fragmentary research which nibbles away on the outer edges of the basic issues while the central nucleus of these unresolved issues builds up into even more formidable proportions. . . . May we not with some profit take a lesson from pure science research where issues of broad scope are identified, resolved into more specific problems, and then attacked on a team basis for solution?" (p. 21). Some broad issues are assessment of objectives, relative importance of criteria, needed changes in methods, general attributes of potential scientists, needed research, and methods of implementing research. Whether or not efforts can be co-ordinated as Obourn believes necessary is an open question. The nearest thing to co-ordination occurs in the annual meetings of AAAS, AERA, and the various associations of teachers of science and mathematics.

Large-Scale Studies and Projects

Institutes, seminars, and curriculum projects and large-scale studies make use of a number of methods of research, but such reports constitute a very small proportion of the studies examined. Among large-scale studies, Wittich and others (1958) acted as a committee to evaluate films used in physics classes. In Kansas, several studies were made involving 300 high schools and 7000 juniors who took the *National Merit Scholarship Qualifying Test* in 1958. When these students became seniors in 1959, they completed a questionnaire prepared by the University of Kansas Bureau of Educational Research and Service, giving a 66 percent (4700) return. In one study, Sanderson and Anderson (1960) selected 100 mathematics

and 100 science students from the respondents who felt they had had inspirational teachers and compared them with 100 who felt they had had noninspirational ones, with reference to group achievement.

A large-scale follow-up survey by LeBold and others (1960) sought information regarding postcollege experiences of the engineering graduates of Purdue from 1911 to 1956. Alumni, faculty, senior students, and freshmen made up four distinct populations, each member receiving a printed questionnaire, a deck of serialized mark-sense IBM cards, and other materials. Size of sample was 6200.

University of Wisconsin arithmetic studies were made at fixed ages for pupils of high, average, and low intelligence. Measures of acquisition, five-minute retention, and six-week retention were made for each intelligence level. A typical study was that of Klausmeier and Feldhusen (1959), who investigated retention at 117 months of age.

Summary

For the period under review, educational research studies in science and mathematics occurred in the following order of percentage frequencies: survey, 39; experimental, 26; development of methods and courses, 17; predictive and correlational, 7; historical and philosophical, 7; large-scale studies and projects, 3; test construction and measurement, 1.

The foregoing distribution is a picture of the existing situation, not necessarily what should be the configuration of educational research in science and mathematics. In many studies, the problem of equivalent group sampling was not met well. Several researchers attempted to match individuals on the basis of one or two characteristics instead of drawing samples at random from a specified population. Assumptions underlying statistical analyses were adequately tested in only a few studies.

It is often contended that performance of research as part of the requirement for a doctorate is more important than the result, in that the degree attests to the candidate's ability to perform research. Nevertheless, studies which revealed nonsignificant differences among methods or treatments or made inferences on the basis of poorly selected samples were disconcertingly frequent. Here are some suggestions:

1. Introduction of the *time* element. If Method A develops more learning and retention than Method B within the same time, or if complete learning can be obtained in a shorter time by Method A, then Method A is superior. When the amount of content dealt with in our schools is under question, importance of the time element cannot be controverted.

2. Examination of changes in variance, e.g., Lucow (1960), as a way of deriving significant results from the data when differences in means turn out to be nonsignificant. If Method A produces the same average result as Method B but allows the expression of individual differences to operate as measured by increase in variance to a greater extent than does B, then A is the superior method.

3. Use of available sampling techniques. As noted, surveys constituted the largest category of studies. Many purported to be analytic, with intent to draw statistical inferences. Yet careful attention to representativeness was not usual. Techniques such as stratified random sampling are well known, and the selection of a sample to represent a population is one of the important steps.

4. Use of the newer multivariate-analysis technique, such modes of statistical operation as partial and multiple correlation, analysis of covariance, and the discriminant function. Factorial design permits stratification of data and the testing of interactions. It is possible to vary all essential conditions simultaneously rather than one at a time, thus yielding greater efficiency and comprehensiveness. The results have wider applicability than those of single experiments, since the latter give information only in respect to a narrowly restricted set of conditions.

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Erratum

Volume XXXI, No. 3, June 1961, page 337, line 6 from the bottom should read "Lucow (1954)." Following is the reference:

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FOREWORD

Comparison of the October 1952 issue of the REVIEW on educational organization, administration, and finance with this issue indicates a marked and significant trend in the nature of research in educational administration during the past decade. The trend has been from an overwhelming emphasis on descriptive, normative studies to a relatively heavy emphasis on empirical studies based on theoretical constructs. This trend was evidenced first by the inclusion of a chapter, "Administrative Roles and Behavior," in the October 1955 issue and again by the chapter, "Administrative Theory, Relationships, and Preparation," in the October 1958 issue. In these two issues, however, there was only limited indication that theoretical formulations were guiding the research efforts reported in the other chapters.

The emphasis on theoretical formulations and on empirical studies to test the hypotheses generated by these formulations continues in this issue, not only in the chapter "Administrative Behavior: Theory and Research," but in other chapters as well. This emphasis is plainly discernible in the chapters "Staff Utilization, Development, and Evaluation," "School-Community Relations," and "Economics and Finance of Education." The changing nature of research presently being reported augurs well for the improvement of administrative leadership in educational organizations.

The contents of this issue differ most markedly from those of the past two issues by (a) an emphasis on research related to the economics of education (Chapter VI) and (b) the inclusion of a new topic, staff utilization and development (Chapter IV). Chapter VI reveals that research workers in the fields of economics and political science, as well as in the field of educational finance, are attempting to assess the contribution of education to the national economy. The findings of these researchers may prove to be significant to all persons who are striving to increase the quantity and quality of public education. Also, there are few, if any, problems of more concern or importance to educational leaders than those relating to staff utilization and development, and the quality of research with respect to these problems appears to be improving. It is believed that readers of the REVIEW will find these new emphases interesting and significant.

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CHAPTER I

Administrative Behavior: Theory and Research

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THIS chapter is concerned chiefly with theoretical and empirical studies of administrative behavior and of training programs in administration. Writings which seemed to present significant conceptual formulations or empirical data were reviewed; texts in educational administration were omitted. Reference was made to studies in educational administration and to those in the general field of administration which appeared relevant to education. The material reviewed was organized under the following divisions: the development and use of theory, organizational behavior, personal variables and leadership, the organization in the larger society, and selection and training.

The Development and Use of Theory

Griffiths dealt with the development of theory in educational administration in two important statements. The first, *Administrative Theory*, was a review of recent attempts in theory building, in which Griffiths (1959a) suggested that theory may be used as a guide to action, to the collection of facts, and to the seeking of new knowledge, as well as a means of explaining the nature of administration. He defined theory as "a set of assumptions from which a set of empirical laws (principles) may be derived." Eight theories in administration, four in educational administration and four in the general field, were then summarized. Griffiths concluded by describing his own theory of decision making in educational administration.

In an appraisal of research in educational administration, Griffiths (1959b) suggested that the whole field is "value bound and practice oriented." He contended that few professors of educational administration do research and that social scientists are not basically interested in the study of administration. This report is useful in depicting the paucity of careful research in this area; it may, however, ignore the interest and contributions of some social scientists to the field.

McClellan (1960) analyzed the growth of organizational theory in educational administration. He suggested that such growth was due to the following: the role of the administrator in the development of a national system of education, the placement of able and ambitious men in a university setting for training, the appearance of theoretical models in related disciplines, and the obsession of American society with the notion of leadership.

Davies and Iannaccone (1958) suggested that organizational theory has gone through three stages: the technical era characterized by Taylorism, the

human era epitomized in the Western Electric studies, and the conceptual era we are now entering. The authors contended that the conceptual stage will bring a molar approach to organizational study, paying particular attention to functional relationships and interdependencies inside the organization and in its social environment.

Halpin (1960), as a basic step in theory building, dealt with ways of knowing, in the following categories: informal (knowing the feel of things), formal (knowledge of the rules), and technical (knowledge of principles). He contended that both scientist and practitioner should allow for all three ways of knowing.

Gross (1959) analyzed sociological literature for its relevance to educational administration. Most useful, he thought, were studies of organizational goals, role definition, interpersonal relationships, social class, power structure, and role conflict.

The question of uniqueness in educational administration was examined by Campbell (1959). Drawing upon the work of Parsons and Getzels, he developed six continuums upon which organizations might be placed. These continuums were (a) complexity of function, (b) intimacy of necessary relationships, (c) difficulty of appraisal, (d) staff professionalization, (e) public visibility and sensitivity, and (f) cruciality to society. He considered continuums (a), (b), and (c) to be at the technical level of an organization; continuum (d) at the managerial level; and continuums (e) and (f) at the institutional level. He noted that the unique elements in administration were located chiefly at the technical and institutional levels, and that elements common to a number of positions were more characteristic of the managerial level.

Getzels (1960) discussed the relationship between theory and practice in administration. He noted that three views may be taken of the problem of improving administration: (a) We might find the natural-born leader. (b) We might provide the administrator with prescriptions based on "best practices." (c) We might provide greater conceptual understanding. Getzels rejected the first two views and maintained that the conceptual approach will provide relational maps, not specific itineraries. This provides the administrator with alternate routes and gives him freedom and opportunity to apply inventiveness and ingenuity to the practice of his art. A somewhat fuller exposition of Getzels' theory is given in Chapter IV of this issue of the REVIEW.

Cunningham (1960) took the position that in a number of areas, research was sufficiently definitive to provide the administrator with specialized knowledge which he might apply to his own situation. In reviewing research on the external school environment he noted useful findings in the areas of community analyses, values, voter behavior, opinion leadership and mass media, and power and influence.

Gross (1959), on the other hand, suggested that the chief contribution of theory and research to the practice of administration is in the concepts made available to the practitioner. Speaking specifically of sociology,

Gross contended that what the sociologist has to offer is a series of sensitizing and analytic concepts and ideas, based on theoretical and empirical analysis, that will allow the practitioner to examine in a more realistic and more incisive way the multiple forces acting in his social environment.

Organizational Behavior

Theories

March and Simon (1958), in a provocative book about the theory of formal organizations, used assumptions about human beings as a basis for grouping propositions about organizational behavior in three broad classes. The model of the organization member as a passive instrument was prominent in the writings of the scientific management period. In more recent years a second model, which assumes that individuals bring attitudes and values to their organization and which emphasizes the need for motivation, has gained prominence. The third model, which March and Simon prefer, assumes that organization members are decision makers and problem solvers, and stresses the rational aspects of organizational behavior. There is little empirical evidence, as yet, to support their model.

In an extension of earlier work, Guba (1960) developed a theory based on assumptions of the second model mentioned above. He suggested that the unique function of administration consists of eliciting human behavior appropriate to the achievement of organizational goals. According to his theory, behavior is guided by two major elements: organizational role definition and individual or personal predisposition. The force through which the administrator elicits behavior along either dimension is power. In terms of the role dimension, formal power (authority) is delegated and vested in the office irrespective of the person who fills it. In terms of the person dimension, informal power (influence) is earned and vested in the individual irrespective of the office he holds. To have authority without influence, or the reverse, is to be half powerful. Alienating forces which threaten to disintegrate the system result from the fact that the two major behavior-determining categories are incongruent. To the extent that role and personal demands are incongruent, conflicting behavioral demands are made upon the person filling the position. The administrator has the assistance of certain integrating forces, such as a common commitment to institutional goals and values, that help him prevent system disintegration and assist in minimizing the gap between his role and person dimensions.

Another framework for the study of organizational structure and behavior was developed by Carlson (1958), who maintained that organizations can best be viewed as social systems. He said that the crucial elements of the social system of an organization are discovered by examining the controls on behavior in the organizational setting. In the presence of these controls internal interest groups develop and become significant forces in organizations. Besides internal controls on behavior, organizations also

have external controls imported into the organization from the larger social system outside.

Presthus (1958) attempted to build a general theory of organizational behavior based on the assumption that anxiety is the most critical variable involved. He held that the reduction of anxiety facilitates accommodation of the individual to the demands of the organization. Complex organizations have an exceptional influence on individual behavior because they are organized systems of expectations. Status and authority reinforce the human tendency to honor majority values. The probability of compliance is increased by the fact that organizational behavior is highly structured group behavior.

Bureaucracy and enterprise were compared by Dimock (1959). He suggested that the four main elements of bureaucracy are hierarchy, specialisation, rules, and impersonality, and that the four main ingredients of enterprise are incentive, idea, person, and process. Bureaucracy is formal and orderly and its strength is science and technology. Enterprise is personal and spontaneous and its strength is innovation and adaptation to change. The weaknesses of bureaucracy are self-centeredness, the avoidance of personal responsibility, and a quest for power. The weaknesses of enterprise are confusion, lack of follow-through, and a disregard for system. Dimock was concerned that enterprise might be threatened by bureaucracy.

Principles of Organization Operation

Several generally accepted principles of organization were re-examined by Etzioni (1959) in the light of actual practice. He found that the traditional line-staff relationship does not apply in professional organizations. Insofar as there is a line-staff relationship at all, the roles are reversed; that is, experts constitute the line structure and managers the staff. Institutional heads may be either experts, semi-experts, or lay administrators. Professional organizations are monocratic only with regard to service activities. The authority structure of major goal activities is highly dispersed. To a large extent, final authority over research and teaching is in the hands of the individual professional.

French and Raven (1960) developed a theory of social power which was based on Lewinian psychology and previous theoretical and empirical work. They identified five common and important kinds of power: reward, coercive, legitimate, referent, and expert.

James (1959) examined the nature of professional authority of school administrators and found that the concept of force is giving way to the concept of persuasion as the basis for authority. James concluded that authority is a privilege, never a vested right, granted to individuals demonstrating superior knowledge and capacity for persuasion to co-operative effort, and that the privilege is revocable at the will of the grantors.

Hanlon (1961) defined authority as the right to make decisions involving others in legitimated subordination, to issue commands based on those deci-

sions, and to expect obedience to those commands. He contrasted authority with power, which involves imposed subordination and the ability to apply sanctions. He rejected the concept of democratic administration and proposed a new model for classifying administrative behavior as ordinant, co-ordinant, or nonordinant, according to the extent to which decision making is shared or delegated.

Argyris (1959) found that skilled employees, who are provided greater opportunity to express more mature predispositions, differ significantly from unskilled workers, who must perform routine tasks. The differences were in the direction of a higher sense of self-worth, greater interest in the quality of their work, greater creativity and productivity outside the organization, and a greater sense of self-actualization. Argyris (1960) also found that although a policy of high wages, excellent working conditions, and minimal involvement may lead to acceptable levels of morale and motivation when things are running smoothly, this type of organization tends to break down under stress. Involvement in determining organizational programs is a prerequisite to enduring organizational commitment.

A number of field studies reported by Kahn and Katz (1960) showed that four variables—the supervisor's ability to play a role differentiated from that of his subordinates, the degree of delegation of authority or closeness of supervision, the quality of supportiveness or employee orientation, and the amount of group cohesiveness—are related consistently to the productivity of a group and to the psychological returns to group members.

Talacchi (1960), in a well-designed study, discovered a relationship between the size of the organization and the general level of employee satisfaction. Large units tend to have a lower level of satisfaction; and a lower level of satisfaction is associated with dysfunctional behavior on the part of employees, such as absenteeism and interpersonal conflict.

Willower (1960b) discussed the relationship between professionalization and satisfaction. He hypothesized that the professional in an organization prefers flexible, hands-off leaders; derives satisfaction primarily from the achievement of professional goals; identifies with the profession rather than with the organization; and is maximally productive when organizational and professional goals coincide.

In an intriguing article Chase (1960) presented a new formulation of the work cycle: (a) Motivation releases energy for work directed toward organization objectives. (b) Work under appropriate conditions leads to achievement. (c) A sense of achievement, when accompanied by recognition and other rewards, tends to produce satisfaction. (d) The experience of satisfaction predisposes toward further achievement in the belief that this also will prove rewarding, and thus is transformed into morale, or the disposition to productive work. (e) This disposition is vitalized and the stored energy is released by motivation. (f) Work follows, leading to satisfaction; and so the cycle continues. The administrator might enhance his effectiveness in implementing goals by paying major attention to motiva-

tion, work, and achievement, allowing satisfaction and morale largely to take care of themselves.

Personal Variables and Leadership

Vroom (1960) found that the more positive a person's attitudes toward an organization, the greater the tendency for him to perceive a similarity between the organization's goals and his own. Accuracy of perception is influenced by (a) extent of agreement between personal and organizational goals and (b) attitude toward the organization.

A study by Wall (1959) showed significant attitudinal differences among educational specialists, teachers, and administrators. The specialists in his sample were described as being more democratic, liberal, and progressive than either of the other groups; teachers were more authoritarian, conservative, and traditional than the others; administrators tended to fall between the first two groups in attitudes. These attitudinal differences may cause unsatisfactory interpersonal relationships.

Kratz (1959) obtained measures of the internal and external orientation of principals. All principals in the nationwide sample were more strongly oriented toward their staffs than to the community, but principals rated "good" by superiors were more strongly oriented to the community than were principals rated "poor."

Malo (1959) sought to discover what personality variables are related to administrative potential in a large insurance organization. He found that executives make a clear-cut distinction between the traits they attribute to promotable and to nonpromotable individuals. Traits described by executives and variables identified through tests were in agreement. The most significant traits were conjunctivity and intensity. Social ability, orientation to reality, achievement drive, and superego integration also were significant.

Lipham (1960) used some of the same attitudinal instruments as well as the *Edwards Personal Preference Schedule* together with interviews to determine the personal variables related to the judged effectiveness of public-school principals. He found that effective principals in the large school system studied were (a) inclined to engage in strong and purposeful activity, (b) concerned with achieving success and positions of higher status, (c) able to relate well to others, and (d) secure in their home and work environment. Ineffective principals were (a) deliberate and preoccupied with speculative reasoning, (b) satisfied with the present level of achievement and status, (c) loath to work with teachers but anxious to assist children, (d) highly dependent on others for support, and (e) likely to exhibit strong emotional reactions in upsetting situations.

The development of the *Tennessee Rating Guide* was described by Kimbrough (1959). This instrument purports to be a valid way of discriminating between effective and ineffective school administrators by estimating

(a) interpersonal relations, (b) intelligent operation, (c) emotional stability, (d) ethical and moral strength, (e) adequacy of communication, and (f) operation as a citizen. Nunnery (1959), reporting three separate studies which compared scores on the *Tennessee Rating Guide* with scores on a battery of tests, concluded that there is no one best instrument for predicting effectiveness as a school administrator.

Boyce (1960) compared the performance of elementary-school principals from three school systems on five tests with evaluations of their professional effectiveness by their superiors. He found several relationships between the predictive instruments and the criterion measure. The Aesthetic and Religious scales of the *Allport-Vernon-Lindzey Scale of Values* and the Abasement and Nurturance factors of the *Edwards Personal Preference Schedule* yielded significant positive correlations with the effectiveness ratings by superiors.

Abbott (1960) examined the influence of values on superintendent-school board relationships. He found that these relationships are influenced not merely by whether the superintendent and board members are in agreement on basic issues, but also by how each member of the relationship perceives the positions of other members.

A typology of administrator-reference-group conflict was developed by Hencley (1960). He found that some conflicts result from real differences between the beliefs and values of superintendents and of others, but that most differences arise from the superintendents' misperceptions of the true state of affairs.

Nimnicht (1959) found that principals overestimate the difference between their views and the views of their superintendents. He assigned this difficulty to faulty communication by the superintendents rather than misperception by principals. Perhaps Hencley's findings would cause him to modify his views.

Analyses of Leadership Behavior

Bennis (1959) attempted to build a coherent leadership theory. He defined leadership as the process by which an agent induces a subordinate to behave in a desired manner. In his formulation, leadership consists of power, a leader, and influence. Power is the perceived ability to control appropriate rewards; a leader is an agent who in fact wields these rewards (or punishments); influence is an agent's control over the subordinates' satisfaction of needs. Bennis developed a typology of organizations based on power and kinds of leadership.

Replicating Halpin's earlier study of leadership behavior, with secondary-school principals rather than superintendents as subjects, Evenson (1959) reported that superintendents, principals, and teachers agree in desiring behavior that is strong in two areas—initiating structure and consideration. The two kinds of behavior are important, relatively independent, and

not incompatible. Inasmuch as there was much disagreement among the three groups in describing the principal's behavior, Evenson cautioned against accepting for evaluative purposes the ratings of the superintendent alone, the staff alone, or the principal himself alone.

Willower (1960a) found that principals employing an idiographic leadership style tend to regard teachers as professionals to a greater extent than do principals employing a nomothetic leadership style. His study was well grounded in theory and involved a large sample from many school districts.

The Organization in the Larger Society

Policy Making

A number of studies have dealt with the relationship between the organization and the larger society of which it is a part. Thompson and McEwen (1960) analyzed previous theoretical and empirical studies and found that goal setting was a significant area for organization-environment interaction. This interaction is both competitive and co-operative and might be categorized as follows: (a) competition—rivalry between two or more organizations mediated by a third party; (b) bargaining—negotiation of an agreement for exchange of goods and services between two or more organizations; (c) co-optation—absorbing new elements into an organization to avert threats to its existence; and (d) coalition—combination of two or more organizations for a common purpose.

Campbell (1960) analyzed the process of policy making in education and proposed a flow chart. He suggested that policy originates in the basic social, economic, political, and technological forces of society, often national and world-wide in scope; that these forces produce debate, the seeking of information, attempts to influence, and other political activity which is usually interrelated at local, state, and national levels; and that such activity leads to formal or legal expression of policy which represents the value choices of influentials who participated in the process.

Five policy-making decisions of a board of education over an extended period of time were examined by Cunningham (1959). He divided the process into initiation, definition, deliberation, enactment, and consequences, and noted that cultural values affected each stage. When board members were unable to agree on alternatives, coalitions were likely to form based on personal and organizational values or on commitments to reference groups with similar interests. Coalitions made the independent board member very important, decreased the policy alternatives, promoted bargaining outside of board meetings, and made the superintendent's task difficult.

Walton (1959) suggested that there are three general approaches to administration: (a) no clear differentiation of the role of administrator from that of the scholar and teacher; (b) clear differentiation of administration as a special function in an organization; and (c) unwitting accept-

ance of complexity of organization and of society, often resulting in the need for the administrator also to become the chief policy maker. Walton accepted the second position and developed a logical theory in which policy making and administration were separate and distinct. The administrator discerns purpose; he does not influence it. Culbertson (1961) wrote a critique on Walton's position in which he suggested that the proposition that administration is common in all organizations is an oversimplification, and that Walton's position does not explain the role of the administrator when he is confronted with conflicting purposes.

Community Influence on the School

Downey (1960) summarized a number of studies having to do with the relationships between various subpublics and their perception of the task of the school. Level of schooling and occupational status were found to be the best predictors of how people perceived the purpose of the school. While there was general agreement that the intellectual purpose was most important, people with more schooling and higher occupational status gave such a purpose even greater emphasis. People with less schooling and lower occupational status tended to give more importance to the social and vocational purposes than did the first group.

Community power structure was dealt with in two studies. Foskett (1960) examined the conditions under which individuals in two Oregon communities came to exercise influence upon community decisions and noted the relationships among these leaders. Some leaders were identified with several areas of activity and some with few. School leaders tended to be identified only with schools. The amount of influence of a leader seemed to be related to his social prestige, sound judgment, and integrity. Foskett concluded that a few highly influential leaders have great influence on community decisions and that education is underrepresented in this group. He also concluded that the businessmen in a community do not constitute a power elite that dominates decision making.

Miller (1958) studied decision-making cliques in a West Coast city and in an English city, using methods developed by Hunter in his Southern city. He concluded that in the cities he studied influentials do not repeatedly act in concert, utilizing subordinate groups, as Hunter reported. There are key leaders who do bring other influentials around them when they are responsible for getting a civic project carried out. Although these groupings do have a pattern and tend to be repeated, there is a significant degree of fluidity. Different combinations appear with different issues. No one person or group dominates. Relatively stable groups of leaders are identified with certain institutional sectors of the community in which they have common interests. Certain key influentials do come together regularly when community issues arise, but they tend to restrict their activity to policy making. Both cities show a fluid core of 12-15 key influ-

entials, with up to 150 other influentials. Hunter's model of a stratified pyramid of power is not applicable to the English city, which has no single solid elite structure and no hierarchical dominance based on one institutional sector. The pattern is rather one of a kaleidoscope of recognizable faces shifting in and out of fluid coalitions as issues change. Hunter's model is partially applicable to the West Coast city, but this city shows considerable fluidity among influentials as issues change.

Two studies dealt with aspects of the relationships between the school and the community. DeGood (1959) found that administrators judged to be effective perceived community viewpoints more accurately than did less effective administrators. Moreover, effective administrators were less likely to permit their own viewpoints to color their judgments of the viewpoints of various groups in the community. McPhee (1959) found that citizens with emergent values tended to have a "modern" educational viewpoint. Measures of extent of approval of the schools showed no significant differences between citizens with emergent values and those with traditional values. Citizens with a viewpoint toward education most like that held by their superintendent were higher in school approval than citizens whose viewpoint differed from that of their superintendent.

Superintendent-School Board Relationships

Several studies examined superintendent-school board relationships. Gross (1958) found that many school board members who are well motivated have hazy notions about their jobs. Moreover, board members and superintendents frequently disagree over their respective rights and obligations. Significant differences in opinion patterns between superintendents and board members occurred in 21 out of 22 areas, in the study by Sletten (1958). He noted that "as the school administrator becomes increasingly aware of what his role should be—a role defined primarily by members of his professional group—the gulf between policy-makers and administrators broadens." Abbott (1960) found that board members who perceived their superintendents to be most similar to themselves in value orientations expressed significantly higher confidence in those superintendents than did board members who perceived their superintendents to be least similar to themselves in value orientations.

Selection and Training

Briner (1960) studied the influence of superintendents' attitudes on the selection of subordinate administrators. He found that superintendents appraised the qualifications of administrative candidates on the basis of three kinds of information: the physical and character *image*, levels of professional and personal *potential*, and levels of demonstrated professional and nonprofessional *competence*. The 29 superintendents in this sample lacked a rational and systematic procedure for appraising the qualifications of

candidates. The influence of attitudes on the selection of subordinates varied with each superintendent, but the superintendents' attitudes represented a continuum ranging from the closed to the open mind.

Tupes, Carp, and Borg (1958) conducted a study of role-playing situations in an Air Force officer candidate school. Scores for behavior in role-playing situations appeared to be related to future success as an Air Force officer and also were significantly related to personality trait ratings. The study indicated that the role-playing situation is a useful selection device, but not predictive enough of success to be used alone.

DeGrazia (1960, 1961) suggested that training people to *be* administrators is more difficult than training people to *study* administration. Guetzkow (1959) said there are distinct differences in the intellectual tasks confronting the social scientist and the user of social science knowledge. He advanced the idea that experts needed for using knowledge are different from those needed for its discovery, and that a "social engineer" is needed as a middleman between the scientist and practitioner. Drawing upon these ideas, Campbell, Charters, and Gragg (1960) identified three roles in educational administration: (a) the scientist, who is a producer of knowledge; (b) the developer or professor, who must be oriented to both the field of knowledge and the world of school practice, who communicates with both scientists and practitioners, and who teaches future practitioners or developers; and (c) the practitioner, who actually directs a school or school system. It was proposed that training programs recognize these three roles.

Culbertson (1960) analyzed the strengths and weaknesses of the use of simulated materials, a recent innovation in training programs. Clark and Ackoff (1959) developed an operational game which can be used to test hypotheses about the efficiency of organizational performance. Although game theory has been used in executive development programs in business and industry, it has not yet been widely used in training educational administrators.

The American Association of School Administrators (1960) examined current preparation programs for superintendents and career patterns of superintendents. Superintendents were found to have strong liberal arts backgrounds, to have almost two years of graduate training in administration, and to have a mean tenure of nine years in their present positions. Most current preparation programs did little to select candidates, were classroom bound rather than field oriented, had little relationship with the basic disciplines, had few full-time students, and had little money to use in helping to correct these conditions.

Some Observations

From this review of the literature we have gained certain impressions.

1. The recent emphasis on theory in administration continues. Often the theoretical constructs are developed by scholars in the social science dis-

ciplines. These formulations, however, are being considered, and at times adapted, by students in educational administration. Even practitioners are becoming aware of theory development and are indicating some readiness to find out what theoretical formulations hold for them.

2. One problem in theoretical and empirical studies of administration is the disposition of different investigators to ascribe different meanings to the same terms. For instance, power and authority have different meanings when used by Guba (1960) than when used by Hanlon (1961). This probably reflects the immaturity of the social sciences, of which the study of administration is a part.

3. There are many theoretical approaches to organizational behavior. Historically, these approaches include scientific management, human relations, and rational problem solving, if we follow March and Simon (1958). Other approaches include bureaucracy and enterprise, anxiety, and social systems. There is little evidence that a grand theory of organizational behavior is emerging.

4. There is evidence that the organization-person emphasis, first enunciated by Barnard in his effectiveness and efficiency concepts, continues to be developed. The work of Guba (1960), Carlson (1958), Dimock (1959), Chase (1960), and Vroom (1960), among others, had some relationship to this basic concept.

5. Without denying the common elements in administration, there seems to be some emphasis on the unique aspects of administration in different organizational settings. Argyris (1959) and Willower (1960a) suggested that organizations staffed with skilled or professional employees should be conceived differently; Etzioni (1959) suggested that line and staff roles are almost reversed in professional organizations; and Campbell (1959) developed some continuums upon which organizations might be located.

6. After years of futile effort with the trait approach to administration, personal variables, perhaps categorized at a more significant level, are being related to administrator behavior. While there are still contradictions in the research, Malo (1959) found significant relationships between personal variables and promotability in business. Lipham (1960) found that many of the same variables are related to judged effectiveness in a school system.

7. The external relationships of organizations appear to be getting additional attention. Conceptual work with social systems and policy making illustrates this emphasis. Important in this area are the studies of Foskett (1960) and Miller (1958), both of which suggest that the generalization to other communities of Hunter's findings on power structure is not appropriate.

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CHAPTER II

Organizational Patterns: State and Federal

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THE OUTSTANDING characteristic of research dealing with the organization and relationships of intermediate, state, and federal educational agencies was that it was descriptive. These areas do not easily lend themselves to an experimental or controlled approach; nevertheless, one must consider this lack a major weakness of research in this field.

In preparing this chapter several sources other than the standard indexes were useful: the *Elementary School Journal's* annual annotated bibliography dealing with public-school administration; the annotated bibliography, *Administration of Higher Education*, by Eells and Hollis (1960); recent issues of *Reporter*, a publication of the U.S. Office of Education; and the third edition of the *Encyclopedia of Educational Research*, edited by Harris (1960).

Federal Relationships to Education

Federal relationships to education proliferated over the past three years, and so did writings on the subject; unfortunately, most writing only explained various governmental proposals or argued for or against federal "interference" in education. Norton (1960) reviewed federal activity in education. His study is of basic importance to any student as a complete description of federal relationships. A similar but simpler review was provided by a publication of the U.S. Department of Health, Education, and Welfare, Office of Education (1960a).

Willbern (1958) pointed out that over a long period of time the national government became stronger in all fields, but that during the past 15 years this tendency, except in the area of defense, was reversed and activities at the state level tended to increase, particularly in education.

Reports of Congressional hearings were a growing source of basic research data on federal relationships to education. This documentary data, although essentially testimonial and statistical, will be of considerable value in the future. The following titles of reports of hearings indicate the variety of subject matter involved: "Science and Education for National Defense," "Juvenile Delinquency," "National Defense Education Act of 1958," "Youth Conservation Corps," and "Program of General University Extension Education."

National Policy

Campbell (1959) explained policy as the "official position of the nation" and found statements of policy in Congressional action, decisions of the

U.S. Supreme Court, and administrative interpretations. Antecedents to certain legislative expressions of policy were singled out by Campbell as foundation-supported efforts involving the National Manpower Council, the National Merit Scholarship program, the Rockefeller report, and the Conant study. He warned that present national policy is obscure and piecemeal, and cited evidence that we may be delegating our long-range planning to those who give grants and who cannot really be held publicly accountable.

Land (1958) concurred in warning of the lack of unified policy at the federal level and pointed out that no single agency could or should account for or be responsible for all federal activities in education at present.

Stoke (1959) and Phenix (1959) debated the issue of educational policy as an expression of national necessity. Stoke maintained that the needs of the nation were such that federal intervention was vital. Phenix rebutted with the claim that national necessity today is "the compulsions of knowing the truth and doing the right," and that federal influence was not necessary to accomplish this end.

Zeitlin (1959) concluded from studying the role of the federal government in the New Deal era that far greater benefits than dangers would accrue as a result of increasing the role of the federal government and allowing it to provide direction and leadership as well as money to the cause of public education. He, too, recommended the clarification of federal policy.

A policy statement by the President's Science Advisory Committee (1960) placed on the federal government the basic responsibility for insuring the quantity and quality of basic research and graduate education and urged that the government seek to promote the essential connection between the conduct of research and the training of scientists.

Additional References: Leach (1959); Martorana (1960); Remmlein (1959); Russell (1958).

Higher Education

The relationship of the federal government to higher education was adequately treated in a book edited by Knight (1960). Here six authorities, in a studiously written report, called on research, existing conditions, and experience to report on the present and to predict for the future. Blauch (1959) offered a more routine presentation of the activities in higher education of the Office of Education.

National Defense Education Act

The National Defense Education Act (NDEA), reported on by the U.S. Department of Health, Education, and Welfare, Office of Education (1960b), became effective after the last issue of the *REVIEW* dealing with the area of administration was written in October 1958. Many thousands of

words have since been published on this topic. These articles are replete with explanations but devoid of research. Writers have decried certain emphases given by the Act, but none has shown definitively the results of such emphases.

Popp (1960) analyzed the first year of operation in California of Part A of Title V of the NDEA. The only major conclusion reached in this study was that the program increased counseling services. Eisen (1960) reported 10 recommendations by directors of NDEA guidance training institutes for improvement of the institutes. One of them encouraged continued leadership from the U.S. Office of Education but emphasized the need for local autonomy. Another questioned the need for the loyalty oath and affidavit.

Campbell (1959) reported the impact of the NDEA on state departments of education and the departments' efforts to adjust their staff organizations to administer various provisions of the Act. He found that many state department spokesmen believed the Act to be "helpful to education," while others displayed misgivings.

The role of the federal government in desegregation is not covered here since it was discussed in two recent issues of the REVIEW ("Human Relations in Education," October 1959, and "The Philosophical and Social Framework of Education," February 1961).

Additional Reference: Holderman (1960).

State Relationships

Over-All Role of State Departments

The trend over the past three years was toward the clarification of the role of the state department of education. Beach and Will's (1955) basic study set the pattern for most of the other studies in this area.

The three major centers for research on the state's relationship to education were the U.S. Office of Education, state study commissions, and university graduate schools. In general, the staff of the U.S. Office of Education concentrated on a comparative and descriptive review of the activities of the 50 states. These studies were objective and mechanically sound, yet the reader looked in vain for analyses which would provide some leadership direction.

Will (1961) presented a theoretical construct of state school administration, likening it to state government, with powers residing in executive, legislative, and judicial branches. He reported that 22 states employed a state board of education, whose functions were chiefly legislative, and an appointed chief state school officer, who together with his staff functioned as the executive arm. Judicial functions were performed by the chief school officer on technical matters and by the state board on civil matters.

Statutory law as it applied to the schools of the state was analyzed in three studies. Hearn (1959) noted a trend toward less specific educational

legislation in Tennessee since 1945, and pointed to the influence of the governor and state board in promoting school legislation. The effect of court decisions on education has been presented in a number of studies, the best of which are Posey's (1960) study of Alabama and Lee's (1960) study of Arkansas. Hamilton and Mort (1959) presented the best summary of the legal basis of state and federal governments' relationships to education.

A rash of histories of various state departments of education, state boards, and chief state school officers appeared in the doctoral theses. Of particular interest were Garofalo's (1958) description of the beginning operations of the Ohio State Board of Education as the state consolidated its boards into one election board which appointed the state superintendent and Apgar's (1958) treatment of the growth of the office of state superintendent.

That states were looking at themselves critically was revealed by the growing number of published state studies of education. No less than 15 of the 50 states published reports on some phase of the organization, role, or function of education within the state. The Kansas Legislative Council (1960) report and the Maryland Self-Survey Commission (1959) report were typical.

Ruff (1959) emphasized the expanding services of state departments of education in the improvement of education in Nebraska. Expanding services and greater centralization of effort also were revealed in Pennsylvania by McCoy (1959), in North Carolina by Prince (1959), and in Alabama by Thomason (1959). cursory reading might indicate a growing loss of local control; however, proper analysis reveals that growth was in the area of state leadership and service as indicated by Hawk (1959) and Grieder, Pierce, and Rosenstengel (1961).

The study by Rich (1960) corroborated this trend. His survey revealed less emphasis on inspection by state departments of education and more on improvement through co-operative action by state and local authorities. Frederick's (1958) study on certification also showed less rigid state control.

Wimpey (1958) attempted to analyze and determine the proper role of the state department of education through the appraisal of state services by 96 selected school officials. Although the sample was limited to Georgia and the appraisal techniques were questionable, the study revealed two things: (a) Local school officials were looking for many more services than they received. (b) There was a wide variation in staff time devoted to educational services. Hopkins (1956) reported similar findings.

Additional References: Erickson (1960); Roberts (1960).

Curriculum and Instruction

Fuller (1960) named emphasis on improvement of the instructional program as the most vital trend in state school administration. Crewson

(1958) studied the New York State Education Department's move from fragmented concepts of supervision to a more generalized instructional leadership. He emphasized the reorientation in department outlook that this change required.

Cummings and Mackintosh (1958) pointed to the development of curriculum guides as opposed to required state courses of study as an example of leadership. They also noted the greater freedom and flexibility allowed local units in selecting textbooks. F. W. Turner (1959) reported that Florida was one of only two states remaining in which textbook selection was a state rather than local function.

The space race had its effect on research. State departments of education became more conscious of the academics. Knapp (1959), in noting that the Ohio State Department of Education was particularly influential in curriculum change, showed that the curriculum movement emphasized a more rigid academic program. The trend was to increase requirements in English, mathematics, and science; to make available more elective courses in languages; and, according to Martin (1960), to increase supervisory activities in the fields of science and mathematics at the state level.

Mahar (1960) noted that state responsibilities for school libraries were intensified, supervisory personnel were increased, and services were strengthened. Umbeck (1960) reported that state legislation in regard to school attendance was tightened.

Wimpy (1958) reported that in Georgia there still was an imbalance in total staff services at the state level, with vocational education and physical education maintaining favored positions. Porter (1960) found that provisions in Connecticut for the instruction of atypical children were equivalent to those in most states, but he nevertheless recommended greater leadership in discovering and helping such children.

Additional References: Divine (1960); Hurd (1960); Simches and Cicensia (1958).

Private Schools

Official relationships between the state and nonpublic schools were found by several writers to have their basis in the corporation laws of the state rather than in explicit provisions.

Beach and Will's (1958) study, made in co-operation with the Council of Chief State School Officers, was basic in this area. It included a compilation of the legal provisions which determine the responsibility of state departments of education for nonpublic schools. Will's (1958) investigation chiefly concerned elementary and secondary schools and complemented the Beach and Will study. Klinger (1958) found laws pertaining to private business schools in only 11 states, with administrative responsibility divided between the state board of education and the state superintendent. Gacek (1958) found that approximately half the states had general legislation controlling the establishment of private junior colleges.

Colvert (1960a), in a survey of 136 private junior colleges, discovered that most state controls related to teaching certificates and courses in government and history. Administrators of these institutions felt the good features of these controls outweighed the bad ones.

Additional Reference: Leslie (1960).

Higher Education

Studies of the relationships of the state and higher education increased because of strengthened leadership in the U.S. Office of Education and state departments of education.

Martorana and Hollis (1960) presented a factual state-by-state description of how higher education is governed. They identified 209 state boards concerned with higher education and 748 public higher institution units for which these boards were responsible. Like Glenny (1960), they advocated greater co-ordination among the state institutions, although not at the sacrifice of freedom, autonomy, and initiative. The growth in single state-wide boards for higher education appeared to be a developing trend.

Skaggs (1959) discussed this trend toward greater centralization of control over higher education in terms of re-evaluation and consequent limiting of local control. Colvert (1960a, b), investigating the extent of external controls on public and private junior colleges, found that control usually was minimal and that the administrators of these colleges considered it helpful.

Along with the increased interest in higher education came a noticeable increase in related legislation. Hollis, Land, and Martorana (1960) reported that more than 1000 items of such legislation were either enacted or considered by the states from July 1, 1958, to December 31, 1959. Major emphasis was on such items as personnel, institutional growth, physical facilities, student finances, and appropriations.

Martorana and Hollis (1960) further emphasized the increase in state-wide concern for higher education by identifying for the years 1956-60 a total of 153 state-wide and interinstitutional studies of higher education.

Criteria for the establishment of two-year colleges were studied by Morrison and Martorana (1960). Potential enrollment, financial support, community interest, and unmet student needs were noted as most important by junior-college administrators. Morrison and Martorana (1958) had previously revealed the intense interest in the two-year college by their annotated list of studies.

In their study of patterns of organization and support of community colleges, Martorana and Morrison (1959) discovered growing state concern but still a tendency toward local and county control. White (1959) attempted to determine whether the county or local junior-college organization best met the educational needs of the citizens of Dallas County, Texas. Factors which would be common to many areas slightly favored the county-operated junior college.

Additional References: Brannan (1960); Brunner (1960); Pence (1960).

Relationships of Intermediate Administrative Units

Interest in the changing intermediate unit continued to grow and found expression chiefly in doctoral dissertations. Ellison (1959) investigated four counties in Nebraska and recommended their formation into two administrative units. G. E. Turner (1959) proposed creation of larger-than-county intermediate units throughout Nebraska. Adams (1960) planned a division of Oklahoma into 18 intermediate units, each including from three to seven counties. These proposals appeared to be well designed; however, none proved that services could not be provided under existing units, nor did they clarify whether the intermediate unit should be oriented to the local or state structure.

Anderson (1959) analyzed the current status of the county as an intermediate unit in Nebraska and made proposals for increasing the usability of the unit as it now exists. The work of the county board of education in California was appraised by Clowes (1960); he found evidence of a lack of policy-making action and emphasis on the performance of many routine functions. Three other studies of different California counties found, on the contrary, that county boards and superintendents played a vital and influential role in the development of a strong administrative unit (Crow, 1959; Snider, 1959; Stump, 1959).

Additional work on the intermediate unit is needed. Implications were that this was essentially a local rather than a state instrumentality; yet there was no clarifying research. While there were areas in the nation where the county unit provided services and leadership, there was no known comprehensive evaluative study described in print.

Additional References: Godfrey (1961); Gregg (1960); Hamilton (1958); Munshaw (1958).

Summary

Several trends were noted in the organizational patterns of state, national, and intermediate administration of education. The federal government increased its contact activities yet lacked clear-cut policies. State units emphasized consultation and service and de-emphasized inspection. The efficiency of local school districts was questioned, and proposals were made for organization of larger intermediate units.

Studies reviewed here were essentially descriptions and surveys. Ordinarily this would indicate basic preparation for more profound research of an experimental and controlled variety. Unhappily, no trend in this direction was observed.

Little use was made of dissertation research. It was discouraging to find that perhaps one or two doctoral theses in a hundred were reported

in any source other than *Dissertation Abstracts* or expanded into more comprehensive studies.

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CHAPTER III

Organizational Patterns: Local School Districts

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ALTHOUGH there are district organization problems in cities, reorganization is currently primarily a rural phenomenon; thus city reorganization is given little emphasis in this chapter. This chapter reviews research on the nature of local district organization, trends in reorganization, factors affecting reorganization, and the effects of reorganization. There was more variety in research in these areas in the last three years than in any prior reporting period.

Organization of Local School Units

Local Administrative Units

Changes in school districts were charted in significant national surveys by both the National Education Association (NEA) and the U.S. Office of Education. Gaumnitz (1959) used a carefully worked out survey method to obtain statistics on rural schools. One of the most important statistics gathered was the number of local administrative units. The base of identification was the rural county. Counties were stratified first on the basis of criteria developed from the 1950 census and next on the basis of percent of rural residence. The American Association of School Administrators (1958) enumerated types of local administrative units, noting the history of their development, variations in their financial abilities, and certain of the legal classifications and designations which one finds in the literature.

A number of reports were produced in Midwestern states, where school reorganization was the most critical. McGehey (1958) summarized the trends in Indiana from 1932 to 1957 and compared them with trends in other Midwestern states. Barr and others (1959) gathered detailed information on all of the consolidated school corporations in Indiana and reported their status as of August 1959. Domian and Keller (1960) reported to the Kansas Legislative Council on elementary and secondary schools in Kansas, stressing number, evaluation, population, tax levy, size, expenditure, socioeconomic level, and growth patterns in the state. They summarized the findings and opinions of citizens school committees in 105 counties and made specific recommendations for school size, finance, and type of district. They recommended large-scale reorganization with minimums of 1200 pupils.

Noble and Dawson (1961) prepared a most helpful summary of background data relating to rural organization, which included factual data

on rural education and relationships to social and economic backgrounds. Keppel (1960) reported on the reform movement in rural education prior to 1914. Her historical study discussed the early ideas of rural leaders whose major efforts were toward curriculum improvement but whose ideas were later used as a base for better organization of districts.

Additional References: Barr (1958); National Education Association, Research Division (1960b, 1961); Purdue University (1959); Summers (1958); Wright (1960).

Local Attendance Units

The most significant studies relating to local attendance units came out of the Catskill Area Project in Small School Design (1959a, b, 1960, 1961). In this project 25 school districts in New York's upper Catskill Mountains region worked together on a number of programs, each involving small numbers of students in any one school. The districts included from 219 to 1100 students. Each school decided whether or not it would share services. The program emphasized the provision of expanded opportunities. The first of these publications (1959a) reported the internal organization in schools serving small groups, developments in the direction of multiple classes under a single teacher, the use of school aids and visual materials, and shared services for talented youth. The second report (1959b) described in detail what school aids accomplished. The third report (1960) described shared services among small local administrative units. The fourth, a report on multiple classes (1961), described the needs which they met and how certain space problems were resolved.

Additional References: Conant (1959); McLure and Miller (1960).

Trends in School-District Organization

Small Rural School Districts

The U.S. Office of Education, through its comprehensive statistical reports on the state school systems and local districts, continued to provide much of the basic data in this field. The survey procedure for rural county school systems was revised to coincide more realistically with that of city school systems. The indexes of educational conditions identified in these reports consisted chiefly of averages, ratios, and percentages; and, as is recognized in the report, these statistics may have hidden many significant facts. Utilizing these statistical studies, Roesch (1959a) identified trends and research problems relating to school-district organization.

Several studies charted the number of rural districts and the impact of reorganization on this number. Gaumnitz (1958) reported on data gathered directly from superintendents of schools in counties selected to fit the criteria of ruralness mentioned earlier. The 101 counties he identified

as most rural met these two basic tests: they were 100 percent rural according to census reports, and 59 percent or more of the total population lived on farms. He pointed out that 78 of the 101 extremely rural counties were located in the Southern and Plains states and that the 101 selected counties contained 32,778 school districts. The U.S. Department of Commerce (1960) reported 42,429 school systems in 1960, a decrease of 20 percent in a two-year period. It was concluded that reorganization laws facilitating annexation and consolidation had led since 1942 to a decline of two-thirds in numbers of school districts.

Harvey (1959), reporting on a comparison of two major types of school-district organization, indicated that the enlarged county-unit type of school district was growing in number and spreading to more states. Dawson and Isenberg (1959) summarized data from public documents to show that the number of districts employing nine or fewer teachers was declining sharply and the number of districts employing 40 or more teachers was gradually increasing. Dawson (1958) enumerated the three most inescapable reasons for district reorganization as teacher shortage, small-district financial problems, and inadequate curriculum.

The concern of the Midwestern states with trends in district organization resulted in excellent summaries by Barr and others (1959), Huys (1959), the Missouri State Department of Education (1960), and Shultz (1961).

Additional References: Foster (1960); Gaumnitz (1959, 1960); Iwamoto (1960); National Education Association (1959); Orr (1958); Shultz (1961); Sumption (1959).

Large Metropolitan School Districts

Zimmer (1961) reported on a study of 12 secondary-school districts in the suburban area of Flint, Michigan, comparing enrollment, facilities, buildings, valuation, tax levy, teacher preparation, and special services with those of the Flint metropolitan system. He concluded that there was urgent need to unify many of these suburban districts and that resistance to doing so was as great as that traditionally ascribed to rural communities. More such studies of metropolitan areas are needed.

Factors Affecting School-District Organization

School-district reorganization is directly affected by financial, political, legal, and sociological factors. Research in these areas has been limited, but that of the past three years gave more information of practical value than was previously available.

Financial Factors

An American Association of School Administrators (1958) publication devoted an entire chapter to school finance policies as they related to school-

district reorganization. The different kinds of state aid and their influence were noted, and earlier research related to finance was summarized. Financial efficiency was clearly associated with the larger district organization, but it was pointed out that small districts in rich agricultural areas with few children to support had tax advantages which negated educational reasons for reorganization. It was concluded that certain financial advantages of reorganization—economical administration, equitable distribution of revenues, and equalized local tax burdens—are important factors.

Chisholm (1959) reported that some finance plans had negative influence on district reorganization. His study summarized the results of other studies and analyzed 13 state finance plans. His major conclusion was that, in general, existing school finance programs did more to retard reorganization than to encourage it.

A study of costs of rural high schools in Kansas was reported by Wright and Pine (1961). The analysis was limited to costs of instruction and plant operation in rural high schools in central Kansas for 1956 and 1957. The detailed cost studies were related specifically to breadth of curriculum offerings, teacher-pupil ratio, and district valuation. This report verified the inverse relationship between size of school and cost per pupil, and demonstrated the direct relationship between reorganization and greater educational opportunities at lower cost per pupil.

Political and Legal Factors

Roesch (1959b) summarized administrative and specialized service staffing in local school districts. Barr and others (1959) reported extensively on the legal aspects of school-district reorganization in Indiana, summarizing both the legislation and the various legal tests of such laws. They concluded that no single piece of legislation would be likely to solve the organization problems in Indiana. Swalls (1958) reported on the two popular laws in Indiana which accounted for 90 percent of its reorganization.

Additional Reference: Barr (1960).

Sociological Factors

Bunger (1960) studied variables pertaining to size of high school and rural-urban character as they related to academic success in college. An interesting use of the Guttman scalogram formula was the development of a scale yielding a continuum from rural to urban communities. Craver (1959) reported different methods of delineating the boundary lines of the sociological secondary-trade community in a broad-scale, large-area school-district reorganization program. He used the fringe survey method, the formula method, the trade-center interview method, and the pupil-questionnaire method. He concluded that the basic considerations inherent in Colonial school-district organization are also essential today: sociological

factors, the cohesive self-sufficient community, the curriculum and school services, the accessibility of the school, an equitable tax base, and the economy of human and economic resources. He concluded that the fringe-area survey method was the most reliable for locating sociological trade-area boundary lines. Gee (1960) reported that the farm population still lagged significantly behind the nonfarm population in educational achievement.

Two comprehensive general studies on resistance to or acceptance of school-district reorganization were completed. Blikre (1960) identified positive and negative factors related to successful and unsuccessful reorganization proposals in North Dakota. Sayres (1960) used ingenious means of identifying recurring reasons for resistance to centralization in New York. He studied the observations, the documents, and the interview records of the New York State Education Department between 1950 and 1958, and investigated the entire population of 100 communities where centralization campaigns had occurred during that period. The three individual factors most related to resistance were concern with increased cost, prospective loss of control, and pupil transportation. A summary of his 10 findings reveals that financial reasons appeared in the records 76 times; political and legal reasons, 93 times; and sociological reasons, 176 times. He reported a $+0.72$ correlation between the number of reasons against reorganization identified in the community and the number of "no" votes on bond issues for buildings.

Additional References: Lindstrom (1958); National Education Association, Research Division (1960a).

Effects of School-District Organization

The most comprehensive research reported was that by Kreitlow (1961), who began a longitudinal study in 1949 with the objective of determining what actually happened after reorganization took place. This chapter includes a number of references to publications by co-workers on this project. Of special note is the availability of four filmed reports of this research (*School District Reorganization*, 1961a, b, c, d). The design of the study, first reported in 1952, was by Kreitlow (1959b). It concerned children who in 1949 were in the first grade in five newly reorganized school districts and in five matched control communities. The effects of reorganization in terms of educational opportunities, achievement, cost, and social impact were measured at first, sixth, ninth, and twelfth grade and five years after graduation from high school.

Educational Opportunities

The Minnesota Education Association (1960) reported on the limited instructional programs of small high schools. This study, by a Committee

on the Intermediate Unit of School Administration, revealed that in spite of extensive reorganization of school districts in Minnesota the schools were still too small to render complete service when tested against minimum criteria. The Indiana School Boards Association (1960) used a technique which provided a comprehensive check list of course offerings, making it possible to readily check curriculum opportunities, and a second check list to measure quality. Barr and others (1959) carefully reviewed previous reorganization studies of educational opportunities and related the findings to the disadvantages of the small township high school in Indiana. Pound and Young (1958) reviewed studies published before 1956 and concluded that increased educational opportunities did result from reorganized school districts.

Tracy (1958) reported on the effects of reorganization in Jefferson County, Colorado, where 42 districts were formed into one. The situation in 1956-57 was compared with that in 1947-48. Conclusions definitely credited reorganization with fine results in increasing opportunity during this period, but their validity was abrogated by the rapid growth of population in the area. The study did not use a control. Barrett (1959) reported the advantages from the multiple-teacher departments which developed as a result of school consolidation. Kreitlow (1959), in a study that utilized nonreorganized communities as controls, reported that the opportunities for pupils at first-grade and sixth-grade levels were greater in reorganized than in nonreorganized school districts. Kreitlow (1961) reported similar findings at the ninth-grade level.

Additional Reference: Green (1959).

Academic Achievement

Hieronymus (1960) made use of the *Iowa Basic Skills Testing Program*, which was given to all students in Iowa public schools in cities of 10,000 population or under. He studied tests given in 1948 in 1005 school systems to 71,000 sixth-, seventh-, and eighth-grade students, dividing the schools into six classifications on the basis of adequacy of school district. He found the greatest difference in achievement generally between schools with multiple-grade teacher load and single-grade load. The data were very convincing that a single-grade teacher load was conducive to high achievement in the basic skills. He reported little difference between schools with full, partial, and no departmentalization. The findings agreed with previous research.

These findings coincided with those of Feldt (1960), who showed advantages at both the ninth grade and the twelfth grade for youngsters in high schools of 200 or more students. In addition to 1959 data, test results for large and small schools between 1948 and 1955 showed similar results. Feldt's implications were clear: the pupil in Iowa who received his elementary education in a rural school and his secondary education in a small high school of 100 or fewer students was in double jeopardy. He suggested,

moreover, that during the high-school years the extent of the pupil's disadvantages would be likely to increase, but his study did not test this hypothesis. It is one that should be tested.

Bunger (1960) reported achievement of college freshmen from different size high schools and related college achievement to number of high-school courses offered. Basically, this study was not of students but of school-community backgrounds, and not of a one-to-one relationship between backgrounds and test scores, but of backgrounds in relation to test scores as predictors of probationary status at the university. The methodology and statistical procedures were developed in a sophisticated fashion and the models were clearly presented. Lathrop (1960) also studied college achievement, reporting on academic grades of students in Iowa State College in relation to size of high school and courses offered in the high school. He found positive relationship between size of high school and academic grades in the first year of college but not much relationship thereafter.

Kreitlow (1959), and *School District Reorganization* (1961a, b, c, d) reported that the academic achievement of boys and girls in reorganized districts was superior to that in nonreorganized districts. The results showed that academic achievement in first grade was greater in nonreorganized districts. By sixth grade the pattern was reversed; out of 22 measures of achievement both boys and girls in reorganized districts were ahead on 21 measures. A number of these were statistically significant. In ninth grade the results again favored those in reorganized districts.

Vincent (1961) reported on a rationale for analysis of a school system and developed a 14-criteria profile to rate quality of program.

Social and Personal Behavior

Two studies indicated a developing interest in this area. Rice (1958) reported a comparative study of 332 students attending one reorganized high school and 472 students attending five small township high schools. All of the schools were in the same county. A comparison of mean scores on the *SRA Youth Inventory* by a *t*-test yielded mixed results, the null hypothesis being accepted, but the potential error in comparing students in one large school with students in five small schools is such that the results are somewhat inconclusive. A second study, by Dowling (1959), measured personal and social behavior of sixth-grade children by revised sections of the *California Test of Personality*. Children represented experimental and control communities which were matched on such criteria as total population, wealth, size of community, nearness to cities, and number of students enrolled. It was Dowling's intent to report factors which would be followed up with the same youngsters at ninth and twelfth grade. At the sixth-grade level he found no differences between the girls in the reorganized and nonreorganized communities, but reported that in using analysis of covariance to control related factors, dif-

ferences on Sense of Personal Worth were at the .05 level of significance in favor of boys in nonreorganized districts.

The studies by Rice and Dowling have touched new territory on the effects of school-district organization and should be continued.

Additional Reference: Kreitlow (1959).

Finance

Freudenthal (1959) reported that if all of California's school districts were unified, 3 percent of the cost of the foundation program would be shifted from state funds to local funds.

Kreitlow (1961) and *School District Reorganization* (1961a) reported that the actual cost of instruction per year for elementary pupils in five pairs of communities was \$12 more per child in the reorganized districts, and that the greatest gain in pupil achievement was in the larger reorganized districts. Bragg (1960) attempted to determine size-cost-achievement relationships among 39 school districts reorganized in Wisconsin between 1948 and 1951. He used cost and size data from annual school reports and achievement data from ninth-grade *Sequential Tests of Education Progress*. He reported no consistent relationships. He believed there was too little variation among his size-cost-achievement factors to enable him to identify any significant pattern of relationships.

Additional References: Fitzwater (1958); Johns and Morphet (1960); Kreitlow (1961); Norton (1959).

The Community

Carpenter (1960) attempted to identify criteria for deciding when a school district is large enough to support a junior or community college. His criteria were tested by research.

Rose (1958) reported on a noncontrolled analysis of Goshen, Arkansas, after it consolidated with Fayetteville and organized a rural community improvement organization. He concluded that this organization replaced the school as the center of activity in the community. Kreitlow (1961) and *School District Reorganization* (1961a) tested a hypothesis long accepted in reorganization circles: that when a community reorganized its open-country elementary schools, the farmers' ties to the village center increased for social and economic services. In a survey of parents when their children were in the first grade and of the same parents when the children were in the sixth grade, he found a slight increase in contacts with the village center in the reorganized communities, but also found an equivalent increase in these ties in the nonreorganized communities.

Administration

There was very little research on the effects of reorganization on administration. Farr (1958) reported a case study of the attempts of a citizens' council to implement district reorganization. Crawford (1958) identified some of the administrative problems encountered in reorganized districts.

Additional Reference: Cooper, Dawson, and Isenberg (1960).

Critique

Summary

It is obvious from the research on school-district reorganization that the general theory which supported reorganization as a basis of improving opportunities was upheld in practice. There was an increasing amount of evidence that pupil achievement was aided by reorganization. This was adequately proved at the elementary grade levels but not so completely at high-school levels. It also was reasonably clear that reorganized school districts provided equal opportunities at lower cost; but reorganization for the purpose of increasing opportunities and achievement often cost the taxpayer more, either through local property taxes or through sources outside the local community.

Needed Research

Roesch (1959a) identified 11 criteria by which to evaluate effectiveness of reorganization. His major suggestion, the need for a lengthened period of observation to study reorganizations, was met by the Kreitlow study. His other major concern was adequate consideration of the socioeconomic impact of reorganization on the school and community. This aspect of reorganization has not been adequately researched in any of the studies thus far reported, although aspects of it are found in a number of studies noted in this chapter; it needs vigorous pursuit.

Barker's current research at the University of Kansas suggested that further research was needed on the transfer of benefits from one size educational community to another. Study behavior, participation of students in school and community activities, teacher-pupil relationships, and pupil-attendance all merited comparison among reorganized districts and between reorganized and nonreorganized districts.

The Bragg (1960) study indicated the need for considerable refinement in investigating cost-size-achievement relationships. The study of personal and social behavior appears to be a significant area for research, particularly in view of the findings of Dowling (1959). Transportation, a typical problem of reorganized school districts, has not been given adequate attention by researchers and needs to be considered in the future.

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CHAPTER IV

Staff Utilization, Development, and Evaluation

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RECENT research on teacher morale, administrator-staff relations, and the evaluation of teacher effectiveness has been characterized by increasing use of systematic theoretical models and research methodology drawn from basic sociopsychological concepts. Unfortunately, this trend has not been evident in much of the research on staff utilization. Efforts which have too often taken the form of demonstrations and promotions have been reported soberly as research. Few of the projects on staff utilization have embodied the basic rationale, research design, and techniques of evaluation that yield convincing evidence. Research on staff utilization, development, and evaluation was selected and reviewed in this chapter only as it related to administration at the local level.

Staff Utilization

Despite complaints that educators have been excessively concerned with teaching methods, abundant support has been given in recent years to innovations in this area. Most of the innovations have not faced squarely the basic philosophic question of whether the chief objective of teaching is academic achievement only or the full development of the whole learner. To do so would clarify the assumptions on which many of the new ventures depend and place in proper context the evidence they yield. Unless one is willing to assume that teaching consists almost entirely of imparting information, much of the present evidence must be regarded as incomplete.

Team Teaching

The term "team teaching" was applied loosely to a wide variety of collaborative activity in teaching. Ohm (1961) suggested the basic rationale for team teaching that is missing from most of the empirical studies. Ohm (1961) and Cunningham (1960) set forth classifications of team teaching models. Anderson (1961) warned that regardless of the pattern of organization adopted the basic problem of instruction remains to be solved. Anderson (1960) compiled an extensive annotated bibliography on team teaching.

Much of the innovative team teaching was done in a project on the utilization of the staff in the secondary school, which was reported by Trump (1959). Among longer established, more carefully developed, and more fully reported projects were those by Bissex (1960); Johnson, Lobb, and

Swenson (1960); Lambert (1960); Nesbitt and Johnson (1960); and the New England School Development Council (1960). One or more of these writers reported that the following advantages were claimed for team teaching with respect to staff utilization: (a) capitalization on teacher strengths and wider influence of good teachers, (b) release of staff time for better preparation and planning, (c) promotion of in-service development of staff, (d) stimulation of co-operation among teachers, (e) promotion of higher salaries and status for teachers, and (f) improvement of faculty morale. Ohm (1961) questioned whether the increased effort required to control and co-ordinate the variables introduced by team teaching is worth whatever effects these variables have on student achievement. He cited the possible deleterious effects of disturbance of the power, status, and authority relations of the school; the shifting of articulation and co-ordination of functions from the principal to the teaching teams; and the resultant changes in the reward, communication, and motivation systems of the school.

There was insufficient evidence on the crucial question of whether the subdivision of the teaching function into specialized parts assigned to individual members of the instructional team is a more productive use of teaching time and talent than the traditional unity of the teaching function as manifest in the single teacher-classroom unit. As Hoppock (1961) pointed out, these innovations, with their focus on the form rather than the substance of teaching, may divert us from coming to grips with the hard task of improving teaching in its broadest sense. Cunningham (1960), after reviewing the literature on team teaching, concluded that the movement had all the earmarks of a fad.

Subprofessional and Paraprofessional Personnel

Teacher aides and other types of assistants were used, often in connection with team teaching and sometimes as a hedge against increases in class size, to relieve teachers of nonprofessional or semiprofessional tasks. The most ambitious experiment with teacher aides began in Bay City, Michigan, schools in 1951 and was extended to include teacher aides in 226 classrooms in 45 school districts. The final report of the project, published by Central Michigan University, Department of Special Studies (1960), cited these conclusions: (a) Teachers with aides spent more time on instructional activities. (b) It was sometimes impossible to distinguish clearly between teaching and nonteaching duties. (c) There were no noticeable changes in teaching methods. (d) There was little objective evidence bearing on the quality of instruction in classrooms with teacher aides as opposed to those without. (e) Teacher aides facilitated better deployment of teachers and experimentation with staffing. (f) Teacher aide practices had little effect on over-all costs of instruction. (g) Many teacher aides were potential re-

cruits for teaching. The report recommended consideration of teacher aides when conditions make normal class size impossible.

Television and Other Mass Media of Instruction

Most of the evidence concerning the effect of television, films, and recordings on staff utilization is subjective. Although television once was hailed as a means of reducing substantially the number of teaching positions at no loss in quality of instruction, there was little reliable research evidence to indicate that this is either possible or desirable. Reports by the Ford Foundation (1959, 1961) and the issue of *Nation's Schools* edited by Wittich (1961), however, suggested that these media of instruction could create a substantially different and potentially more effective role for the teacher in the total instructional process. By facilitating variations in class size and scheduling, these media permitted teachers more time for preparing lessons, working with individual students, counseling, correcting papers, and providing special services not previously possible.

Autoinstructional Devices

Teaching machines and other autoinstructional devices, only recently moved from the laboratory to the testing phase in public schools, now are being developed rapidly—too rapidly, in the minds of many. Lumsdaine and Glaser (1960) compiled a comprehensive source book and annotated bibliography relating to teaching machines and programmed learning. Finn (1960) established a useful classification of such devices. Although these devices have not yet brought about widespread changes in staff utilization, it is possible to foresee some of the more probable consequences typified by Blyth's (1960) findings from his experiment in a college class in logic:

- (a) saving in time required for presentation of content, diagnosis of specific learning difficulties, checking routine assignments, and so on, and
- (b) utilization of this released time for presentation of additional or enriched content and for work with individual students and small groups.

Relief from Noninstructional Duties

Dombrow (1960) demonstrated that a school staff could be used more effectively when relieved of certain noninstructional tasks by automatic data-processing machinery. Brown (1960) discovered that teachers and administrators ascribed a greater variety of noninstructional duties to teaching than did lay people. Roberts (1960), in a study of a single school system, suggested that the problem of preoccupation with noninstructional duties may be exaggerated, and that it is difficult to separate such duties, organizationally and staffwise, from classroom teaching functions. Sunder-

man (1960) found few schools providing adequate facilities for teachers' noninstructional tasks.

Staffing Adequacy

Landerholm (1960) found that the most adaptable school systems, as measured by Mort and others' instrument, *The Growing Edge*, had an average numerical staffing adequacy index of 68 professionals per 1000 pupil units; employed 18 professional specialists per 1000 pupil units; and kept class size smaller than did less adaptable schools. Vincent, McKenna, and Swanson (1960) examined the relationship between numerical staffing adequacy and adaptability in 132 school systems and concluded that the larger classes should be instituted only, if at all, as a tactic for paying higher salaries to obtain better teachers. Wynn (1958) developed guides and standards for staffing adequacy from the judgment of administrators, supervisors, specialists, and teachers in 12 suburban school systems.

Certain conclusions concerning experience with the new patterns of staff utilization could be reached with some confidence: (a) The evidence was sufficiently encouraging to justify further experimentation. (b) Although most experiments did not result in any over-all saving of professional time or money (as was once predicted and sought), a substantial amount of time was reallocated among tasks. (c) There was little doubt that the role of the teacher would change significantly if the new technology were widely used. Although it was still too early to forecast confidently the exact nature of these changes, images of the future were depicted by Trump (1959) and Ramo (1960). Many writers saw in the new patterns of staff utilization greater opportunity for performance, advancement, status, and reward for the teacher through liberation from pedestrian tasks. Perhaps the most fateful possibility inherent in the new technology was that the television director, the motion picture editor, and the teaching machine manufacturer might pre-empt the curriculum-building function of the teacher more than the textbook author ever did.

The most immediate needs for future staff utilization studies included the following: (a) clarification of the goals of education and teaching as seen by the investigators, (b) more careful study of the effects of the innovations on the planned use of faculty time, (c) greater attention to the substance as well as the form or method of teaching, (d) more rigorous research designs and less cavalier promotion and prediction, and (e) control of experimentation and development of the new technology by educators, psychologists, and others qualified for the task.

Additional References: Gibson (1960); Hagerstown Board of Education (1959); Howell, Burns, and Hill (1958); National Education Association, Research Division (1959); National Education Association, Research Division and American Association of School Administrators (1960); Noall and Wilson (1960); Turney (1959).

Staff Development

Recruitment and Selection

Previously reported research and practice revealed that few school systems operated well-defined programs of recruitment, selection, and appointment; school districts continued to rely on chance and a limited market area for the procurement of teachers. Although more research is needed to determine the most effective recruitment and selection practices, such research is not likely to be too fruitful until more is known about predicting teacher efficiency.

Orientation

Alford (1958), Davis (1959), Livingston (1957), Walters (1958), and others showed that most teachers who left the profession did so within two to five years. Cooley (1958) discovered that teachers wanted good orientation programs but that boards of education were reluctant to establish and finance them. Winger (1959) found that most orientation programs focused primarily on minor administrative duties of teachers and were seldom related to inservice development. Hudson (1959) discovered that teachers were interested chiefly in problems involving human relations in the classroom. Ball (1960) concluded that informal group discussion of problems was an excellent technique to help beginning teachers understand and control classroom behavior of students. Orientation programs which provided material of immediate classroom utility appeared to be needed widely.

Inservice Development

The need for improving local inservice programs was substantiated by several studies. Whitmore (1960) concluded that few school districts with populations up to 50,000 had organized inservice development programs. Hassel (1960) found programs planned and operated largely by administrators. Gerheim (1959) and Cory (1959) found that teachers accepted and valued inservice programs which were planned carefully, locally, and co-operatively.

Willink (1959) reported that inservice programs commonly made use of faculty meetings, individual teacher conferences, classroom visitation days, informal group discussions, and workshops. The developmental leave and extended school year have been promoted as useful means of stimulating inservice growth of teachers. The need for variation in programs was indicated by the findings of Della-Dora (1960).

Administrator-Staff Relations

Recent research on administrator-staff relations was oriented to the development and utilization of theoretical models that illuminate the connection between role theory and interpersonal relationships of administrators and staff. Getzels (1958) presented a model in which administration was conceived as a social process operating along two parallel axes: the nomothetic axis, consisting of "institution," "role," and "expectation"; and the idiographic axis, consisting of "individual," "personality," and "needs." Each term on each axis was the analytic unit for the term preceding it. The basic premise of the model was that the behavior of an individual within a social system (the school) results from both the nomothetic axis (expectations held for him by others) and the idiographic axis (his own personality needs). Several useful empirical applications were derived from the model. For example, institutional and individual conflict in a school system could be defined in terms of mutual interference of three basic types of role-personality conflicts, role conflicts, and personality conflicts. Further study of this application led to the generalization by Hills (1960) and Campbell (1959) that job satisfaction is determined by the relationship between institutional expectations and individual needs. Hills maintained that the basic task of personnel administration is to integrate the demands of the institution with those of staff members in a way that is productive for the institution and satisfying for the individual. Getzels' model also facilitated the classification of leadership styles in terms of the model: nomothetic, idiographic, and transactional. The last style attempts to satisfy both individual needs and institutional expectations as the situation requires.

Several studies have documented wide variation in perceptions held by teachers and administrators toward roles, expectations, and needs of others. The Council for Administrative Leadership (1959) revealed substantial differences between perceptions of administrators held by 1009 New York State teachers and those held by administrators themselves. Teachers generally perceived administration ideally as the position of leadership rather than that of authority or management; they yearned for sharper job definitions of administrative positions; they expected administrators to possess vast knowledge of education; they valued administrators who were perceptive of teaching needs and attempted to meet them; they liked administrators who possessed personal characteristics valued among people in general.

August (1958) and Jenkins (1960) found that administrators were not very perceptive of new teachers' values and needs. Hallberg (1960) reported evidence of conflict in role expectation relating to the supervisory function among superintendents, principals, and teachers, with resulting job dissatisfaction. Nimnicht (1959) found considerable divergence between the perception of superintendents by principals and the perception of self by superintendents. Hamm (1960) and Martin (1960) found wide

variations of meaning attached to educational terms by teachers and administrators.

Morale

The most ambitious research on teacher morale was undertaken by Redefor (1959), who with his associates developed a unique "opinionnaire" that yields a Morale Tendency Score. They conducted studies of faculty morale in 24 school systems involving more than 5000 teachers. Although the project was not fully reported, Redefor established several generalizations based on data compiled at the time: (a) Morale and quality of education are closely related. (b) A teacher's morale and his superior's rating of him are closely related. (c) Salary and salary schedules, although important, do not determine the individual's or the faculty's morale. (d) "Problem" schools do not necessarily cause low morale. (e) Morale is not closely related to marital status, sex, age, grade-level assignment, or socioeconomic status of the school community.

Harap (1959) studied the returns from morale surveys conducted in 20 school systems by the Division of Field Studies, George Peabody College for Teachers, and reported the most common causes of poor morale: inadequate salaries, large classes, poor administration, lack of daily period of relaxation, unsatisfactory plant and buildings, lack of teaching materials and equipment, absence of democratic procedure, lack of co-operation between the board of education and the public, impoverished social and recreational life, and inadequate tenure provisions.

In studies of small samples of teachers, Chandler (1959) and Carpenter (1959) concluded that the type of salary schedule utilized by a school system, i.e., merit or nonmerit, is not, in isolation, a significant determinant of morale.

Beckman (1960), Cohen (1959), Hodges (1958), O'Connor (1958), and Ross (1960) concluded that the quality of administration is a powerful determinant of faculty morale. Hodges (1958) also found a high correlation between teacher morale and the quality of pupil-teacher relationships. Bernstein (1959), from limited data from 282 teachers in one school system, reported these conclusions: (a) There is a strong relationship between teachers' morale and their perception of their principal and board of education. (b) Convergence of role expectation and role perception of a principal and board of education is associated with high teacher morale; divergence, with low morale.

More sophisticated research methodology is needed in the study of teacher morale to probe the relationship between morale and such variables as acts of administrative behavior, aspects of personnel policy, new ventures in staff utilization, and organizational characteristics.

Additional References: Carey (1959); Cowan (1960); DiNardo (1960); Hall (1960); Rombouts (1959); Roth (1958); Taylor (1959); Woods (1958).

Evaluation of Staff Effectiveness

Research on teacher effectiveness was handicapped by elusiveness of the ultimate criteria of good teaching; inadequacies of instruments, techniques, and procedures designed to measure teacher effectiveness; difficulty of controlling variables; and lack of an undergirding systematic theory. Several significant new approaches to the problem sought correlations between operational descriptions of teacher behavior and intermediate criteria of effectiveness.

Ryans (1960) reported the most extensive investigation of teacher behavior and characteristics undertaken to date: the Teacher Characteristics Study. This study represented a significant advance in research on teachers' classroom behavior. Ryans and his associates provided a sound paradigm, highly refined instruments, a taxonomy of patterns of teacher behavior, and a matrix of important data on intermediate criteria having known relationship to teachers' behavior and characteristics. These enabled Ryans to gather data on the characteristics of a national sample of 6000 teachers in 1700 schools through systematic observation, and facilitated the comparison of teachers with respect to conditions of employment, personal status, activities, and attributes. Criterion groups of teachers were segregated according to uniformly high, average, or low observer assessments of the major patterns of teachers' classroom behavior: Pattern X—warm, understanding, friendly *vs.* aloof, egocentric, restricted; Pattern Y—responsible, businesslike, systematic *vs.* evading, unplanned, slipshod; Pattern T—stimulating, imaginative, surgent *vs.* dull, routine. The characteristics which distinguished the high group included the following: generosity in appraisal of behavior and motives of others, strong interest in reading and literary affairs, interest in the arts, participation in social groups, enjoyment of relationships with pupils, preference for permissive classroom climate, superior verbal intelligence, and superior emotional adjustment.

Turner and Fattu (1960b) developed a systematic rationale for guiding studies of elementary teachers' effectiveness. Their rationale was based on the theory that effective teacher behavior is essentially proficiency in solving a wide scope of teaching problems. Turner and Fattu (1960a) sought to measure this problem-solving proficiency through the use of constructed laboratory problems which characterized elementary-school teaching. Their strategy was to (a) acquire data about teacher problem-solving processes and the independent variables that affect them; (b) identify a group of elementary teachers with high proficiency in problem solving; and (c) show that the procedures which characterize this group would yield an operationally defined concept of "the professional teacher." The advantage of this approach is its foundation on a systematic theory of teacher effectiveness. Its difficulty lies in the establishment of valid criteria for determining "effective" problem solving.

Cosgrove (1959) and Barr (1960) designed instruments for the self-evaluation of teachers. Both are scored objectively and are discriminating but were not validated against external criteria. Howsam (1960), Vander Werf (1960), and the New York State Teachers Association (1959) prepared excellent bibliographies and summaries of research on the evaluation of teacher performance. Howsam's report included an excellent guide for the administration of local teacher-evaluation programs.

Additional research based on theory and methodology drawn from the behavioral sciences and better definitions of ultimate and intermediate criteria of effective teaching are needed.

Additional References: Barr (1958); Cogan (1958); Getzels and Jackson (1960); McCall and Krause (1959); Medley and Mitzel (1959); Mitzel and Gross (1958); Mosier (1960); and Stapley (1958).

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CHAPTER V

School-Community Relations

THEODORE J. JENSON and W. FREDERICK STAUB

INTENSIFIED interest on the part of lay and professional people, concern for the standing of American education in the world community, mobility and social change, changing value patterns and subsequent criticism with respect to provisions for learning, and outright competition of education with other public services sharpened the focus on needs for research for deeper understandings regarding school-community relations.

The School as a Political Institution

In some respects, according to political scientists, schools occupied a privileged political position. Money Penny (1960) speculated that "the schools' isolation from general political issues may make it difficult for them to get support for the enormous demands on income and manpower which they will be making in the future." Local resources, however, were being increasingly marshaled for political action and were used much more effectively, particularly at state levels.

Little significant research appeared to have been done on this topic, except for that at Stanford University, which is discussed later in this chapter.

Concepts of School-Community Relations

Mounting evidence that educational policy would be made by processes involving action at the local, state, and national levels pointed to the need to clarify concepts of school-community relations. Bullock's (1959) study appeared to indicate that the one-way flow from the school to the community no longer would suffice. He found that laymen believed that school policies should be developed as the result of co-operative endeavor. Pilapil (1959), in a study of attitudes in small school districts, and Bergstein (1960), in a study of interests, showed that laymen were interested in working with educational specialists to resolve problems of common concern.

Administrative Relationships

Forty-one superintendents of city school districts with populations of 300,000 and over, at their 1961 meeting in Philadelphia, selected "Superintendent-School Board Relationships" as a major topic for discussion. The

general programs and discussion groups at the 1961 meeting of the American Association of School Administrators provided further evidence of the general interest in and concern about administrative relationships. Interests centered on relationships with boards, on power structure, and on relations with the community in general.

Relationships with the Board of Education

A new turn in the relationship of the superintendent with his board appeared to have gained acceptance. Legally the superintendent is an employee of the district, and he often regarded himself as an agent for the board, the staff, or the community. With the change, the superintendent came to see himself not as an agent, but rather as a professional with definite responsibility to the district.

McCarty (1960) provided additional insights for the improvement of superintendent-board relationships. He found three keys to improvement of relations: (a) The duties of the chief executive should be sharply defined. (b) Board functions should focus on defining the purposes of the school system and evaluating how well these purposes are met. (c) The board should realize that the superintendent is an administrator, not a goal setter. Bell and Green (1960) analyzed the services of boards of education in terms of relationships to administration and found that selection of school staff, parent relations programs, maintenance and operation of buildings and facilities, and testing and evaluating programs were the most significant services. Campbell's (1959) analysis of the common and unique features of administration, although limited to six facets, suggested that the common elements in administration tended to be found at the managerial level and that differentiations came at the technical and institutional levels. A more detailed review of Campbell's analysis is given in Chapter I of this issue of the REVIEW.

Additional References: Herman (1959); White (1959).

Relationships with the Community Power Structure

Bell (1958) found that the concept of "power structure" had taken on wide, diffuse, and pluralistic meanings. His contentions were based on a careful analysis of the use of the term in books and articles.

Dick (1960) contributed a new method of ranking community influentials. He applied scaling and image analysis techniques that ranked persons of influence along a single dimension. Adams and Romney (1959) contributed a method of functional analysis of authority, which, although limited in scope, had possibilities for deeper analysis of power structure phenomena.

Harvey (1960), in a well-designed study using test and control groups, noted the reciprocal influence of the group and three types of leaders in an

unstructured situation. He used the formal, informal, and formal-informal leader types; leaders were subjected to different stimuli from those applied to group members. He found that formal leaders were most influenced by the group and that all leaders conformed markedly to the judgments of the group. Leaders who departed from group judgments in their own evaluations had little influence on the group, and informal status in the group was not related to proneness to influence. These findings had interesting implications for the school administrator in his dealings with power structures, with influentials, and with pressure groups in the community.

Additional Reference: Hall (1959).

Relationships with the Community in General

Effects of urbanization, increasing enrollments, resistance to increasing costs, and ever-increasing demands on the schools accentuated the need for good administration-community relationships. As a result, this review period was characterized by increasing use of community surveys, building surveys, community opinion surveys on educational matters, and various kinds of formal and informal assessments involving the administration and the community. Fountain (1958) used a structured interview technique in an analysis of the school superintendent's role in school-community relations. His limited sample in North Carolina indicated a possibility that when state control was strong, local administrators were encouraged to develop local community leadership and strong participation by citizens. As might have been expected, the study indicated that local administrators did not make full use of tools and techniques for school-community relations. Administrators accepted the fact that quality of education was related to local understanding of the problems of education. The study also indicated a need for better preservice training in public relations for administrators.

In a new line of inquiry, Anderson and Anderson (1959) made a historical analysis of voluntary associations in the community to check the effect of urbanization. This facet of community analysis needed much more study, but it did indicate that voluntary associations in the community were less significant than many thought they were, especially in such social phenomena as urbanization.

In Young and Dillman's (1960) study of the relative importance of the school superintendent's functions, school-community relations were placed high on the list by administrators in two widely separated states and by a panel of experts. Ranking and forced-choice methods were employed. Although this study had limited significance, it tended to support various formal and informal polls of administrators citing school-community relations as a top-ranking concern of administration.

Additional References: Hager (1959); Riess (1959); Savard (1960).

School-Board-Community Relationships

Research on school-board-community relations continued to be of the normative survey, status study, and "opinionnaire" types. Some minor studies employed the critical incident and behavior analysis techniques. A few studies centered on characteristics of board members; Albert (1959) attempted to match selected characteristics of board members with their attitudes toward certain criticisms of the public schools.

Shannon (1959) made one of the more global studies of the review period. He polled the delegates to a National School Boards Association meeting to determine what they wanted to know about their schools and received a 77-percent return. Employing appropriate statistical techniques, he found significant differences in responses according to regions in the United States and between the experienced and less experienced board members. Differences were most marked among responses on curriculum and the general objectives of schools.

Timmons (1960, 1961), utilizing the Thurstone scaling technique, developed a weighted scale for school-board practices. From a large number of practices, 32 were found to be fairly general and were assigned weighted values. Practices that ranked high on the list included co-operation with community agencies, encouragement for community groups to make use of school facilities, and evaluation of the school program. This study represented a new line of inquiry and an improved tool for boards to use in examining local practices.

Additional Reference: Newell (1961).

Citizen Participation in School Affairs

Carter (1960), under a grant from the U.S. Office of Education to the Institute for Communication Research at Stanford University, made a thorough analysis of voters and their involvement with their schools. The three-year investigation, beginning in 1957, followed two paths: (a) interviews with voters in 82 school districts in 48 states and (b) a mail survey in 1054 school districts in the nation. Nine hundred voters were interviewed before and after bond elections, and 2524 registered voters in three typical urban areas were interviewed. The task was to discover those factors that influenced school-community relations and, by implication, support of public education. The study sought the factors affecting voter involvement in school affairs—attitudes, activities, and communication behavior. The conclusions were not at all encouraging. Participation was low, and, aside from the parents, schools had little immediate support. As children grew up, the schools lost the parents, too. Recent studies indicated that citizens tended to participate in school affairs on an *ad hoc* basis and that their committee efforts were solicited by boards of education. In a Wisconsin study, McGraw (1958) found that

many such temporary committees had been formed, that the superintendent served as the liaison between the board of education and the committees, and that the committees performed a communications function. In selected Michigan communities, McLaughlin (1960) discovered that people in districts that had carried on school-community studies were less inclined to be satisfied with conditions in their schools than were those in districts that had not done so. Williams (1959), in a Colorado survey, found that 87.7 percent of the committees achieved their purpose when the objectives were clearly understood at the outset.

Additional References: Day (1959); Gass (1959); Lesly (1959-60); McGirr (1961); Manheim (1960); Sanders (1960).

Home and School Relationships

Perceptive understanding is a key element in home and school or community and school relationships, according to Carter and Sutthoff (1960) in their report of the Stanford University study, *Communities and Their Schools*. This companion study to *Voters and Their Schools* also was supported by a grant from the U.S. Office of Education. It was indicated that the sources of difficulty in school-community relations were many and that their interaction was complex. The study showed a striking response to failure: political action. The better the understanding, the better the possibilities of good support of school and program. A revelation by the study was the imperative need for effective mediating agencies between school and community.

Mobility and Its Effects

Mobility and concomitant change in communities continued to accentuate the problems in school-parent relationships. All indexes pointed to increased mobility in population. Many parents were in an almost continuous state of adjustment with new school situations. In Schmitt's (1958) study of one large community, 25 percent of the people replied that they were living in different houses than a year ago. Goldstein (1958), using a selective spot-check survey technique, found evidence that economics, occupational change, and social conditions were the chief reasons for mobility. Jonassen and Peres (1960) used a factor-analysis approach to the study of community dimensions and the development of a "commuscale." They studied 82 dimensions of four major factors of populations—size, density, urbanization, and stability. Stability of population was one of the seven major factors of enough importance statistically to be included in the scale. Andrews (1958) found that parents of students in smaller high schools were slightly better informed on school affairs and felt that they had better home-school relations than parents in large high-school

situations; he also found that in small high schools there was considerably more parent participation in school affairs.

Parent Attitudes

There were a number of studies on parent attitudes toward the schools, such as attitudes on reporting of student achievement, on curriculum, and the like. Bullock (1959) developed a useful scale for measuring parent and citizen attitudes toward school, school affairs, and school situations. Kingsley (1959) studied the reactions of parents to various procedures for reporting student achievement. Although his sample was limited, the reactions indicated the complexity of the problem.

Additional References: Brown (1960); Gross (1958); Lonsdale (1960); National Education Association, Research Division (1961); Parker (1960).

Communication and School-Community Relations

An upsurge of interest in communication was evident in recent developments among centers and institutes for communication, telecommunication centers, task forces in communication research, and similar formal structures.

Empathy and Communication

Gompertz (1960) contributed a useful review of research and a bibliography on the relation of empathy to effective communication. He concluded that empathy was a quantifiable and complex skill involving the total organism, that it could be improved by training and practice, that it was basic to communication and human emotions, that communication could convey or create emotion, and that empathic responsiveness had high positive correlation with ability to communicate effectively.

Communication Media

Research on the use of communication media in school-community relations continued at an accelerated pace. Cohn (1959) studied the relationship of a community newspaper to the educational problems of the community. He found that people were influenced by what they read about the schools, but that relationship of reading habits and interpretations to favorable or unfavorable acts on school problems was conjectural. He suggested that the local newspaper was a mediating influence. Zeller (1959) studied the differences in diffusion and recall between two

ways of school-to-home communication. He compared verbal announcements at parents meetings with take-home notices and found no significant differences. The sample was very limited, and a replication of the study with a larger sample might produce different findings. Knutson (1960) took a new direction in the study of communications. He divided quiet and vocal college students into separate groups, each to discuss the same problem. The best problem solutions, according to jury judgments, came from the quiet group; this group expressed less satisfaction with the group experience than did the vocal group. Cartwright (1959) found that rumor media appeared and flourished among persons who felt strongly that their destinies were controlled by others and not by themselves.

Additional References: Cohen, Silverman, and Shmavonian (1959); Jones and Stout (1960); Katz (1960); MacLean and Pinna (1958); Mulder (1960); National Education Association and American Association of School Administrators, Educational Policies Commission (1958); O'Connell (1958); Schramm and Carter (1959); Wrolstad (1960).

Criticisms of the Schools

Enterprises supported by public funds live in an arena of criticism, and the schools have been sensitive to this fact for many years. Ingalls (1959) concluded that many of the current criticisms of education may result from inadequate understanding of what the schools are trying to achieve and what they actually are achieving. Albert (1959) analyzed selected characteristics of school-board members and their attitudes toward criticisms of public-school education in cities with populations of more than 30,000. Board members in the Middle Atlantic states and the Southeast agreed with negative criticisms about schools to a greater extent than did board members in the Middle West and the Far West. Women board members and board members between the ages of 40 and 50 were less prone to agree with criticisms, and board members over 60 were more prone to agree.

Evaluating School-Community Relations

Much of the research that evaluated school-community relations was not highly significant and consisted of hindsight after bond elections had failed, limited opinion research on effectiveness of items in public relations programs, and speculative studies. Dunworth's (1959) study was significant in that he attempted to measure possible change in attitudes as a result of a planned program of instruction for parents and pupil groups on schools and education. Although their level of information had improved after instruction, their attitudes remained approximately the same as before the program was initiated.

Programs for Improving School-Community Relations

There was little general analysis of programs for school-community relations. Most of the studies were directed toward specific aspects of a program or a single technique. Armitage (1960) appraised programs in selected Ohio cities in relation to school support. In cities with good support, the programs were characterized by good two-way communication, team effort, continuous efforts to improve the program, and a strong in-service program for teachers to build community-school understandings.

Needed Research

Much of the research reported in this period suffers from the practical and traditional ailments of educational research in general. More rigor, better design, and new theory are needed. The effects of mobility and change on school-community relations loom ever more important. More must be learned about factors that impede and accelerate change and innovation; about motivational situations; about the politics of school-community relations; about "networks" of persons on staffs, in the community, and elsewhere; about factors that make for commitment; about mediating agencies and influences; about community decision making; about the practical application of empathy in school-community relations; and about how to recognize and deal with change.

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CHAPTER VI

Economics and Finance of Education

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RESearch during the period of review was characterized by two overshadowing concerns. One was the value of education to the economic well-being of the nation. The other was the rationale of principles to meet the educational task of the future.

Important recurring concerns dealt with the analysis of trends in taxation, sources of financial support, allocation of resources among levels of government, higher education, and evaluation of practices.

The Economics of Educational Finance

During the past three years, researchers in educational finance, economics, and public finance gave increased attention to the relationship of education to the national economy, an area previously neglected. All three books on school finance written during this period—Barr (1960), Johns and Morphet (1960), and Benson (1961)—extensively applied the concepts of economics and public finance to educational finance. Benson's work was particularly significant for this emphasis.

The emphasis in research shifted from concern with normative studies and distributive technology to theoretical conceptualization and the examination of economic theories and models. Benson (1961) expressed the principal dynamic of economics as the allocation of resources and the central concept as scarcity. The most important assumption underlying most economic models was that the goal of the economic system was a growing economy that maximized the per capita production and consumption of goods and services. However, the classical economists, micro-economists, whose concepts were first expressed by Adam Smith in *The Wealth of Nations* published in 1776, long held that expenditures for government, including public education, constituted a subtraction from the total economy, not an addition to it. The concept of the macro-economists, on the other hand, is that expenditures for government, including public education, are a part of the total economy and an addition to it. This point of view was expressed by John Maynard Keynes in *The General Theory of Employment, Interest and Money* published in 1936. The influence of Keynesian theories has been significant enough to cause a re-examination in recent years of such economic theories as the relative influence of different factors of production, alternative investment choices, alternative householder choices, marginal utility, and consumer demand.

Factors of Production

The classical economists, in their economic model for explaining production, included only the factors of land, physical capital, and labor. The validity of this model was seriously challenged. Fabricant (1959a) presented estimates that showed that the output of the private domestic economy of the United States increased at the rate of 3.5 percent per year between 1889 and 1957, whereas the total input of labor and physical capital increased at the rate of only 1.7 percent per year. Between 1919 and 1957 the annual rate of increase of the national product was 3.1 percent, and the weighted input of labor and capital was only 1.0 percent. This left a large portion of the increase in production unexplained by the input of labor and capital. Fabricant (1959b) concluded that investments in labor and tangible capital could not explain all economic growth, and he suggested that investments in education, research, and development and other intangible capital might account for the difference.

Schultz (1961a) attempted to determine how much of the unexplained portion of growth in the national product was attributable to investment in education. He allocated a portion of the expenditure for education to consumption and the remainder to investment. Using different assumptions, he estimated the rates of return on investment in education as indicated by increased earning power at 9 percent, 11 percent, and 17.3 percent. Assuming a 9-percent return, he estimated that investment in education explained 36 percent of the unexplained increase in national income; assuming 11 percent, it explained 44 percent; and assuming 17.3 percent, it explained 70 percent of the unexplained increase.

Investment in Education and the National Product

Schultz (1961b) noted that input-output theories of economics were difficult to apply to education. The input in education was both individual and social. It was fairly simple to measure input by adding to the social cost the income foregone by the student. It also was fairly easy to estimate the output benefits to the individual in terms of income, but no researcher seriously attempted to measure the social output benefits of education.

A number of studies were made of the return to the individual from investment in education. Becker (1960) made a carefully designed study of the rate of return from the investment in college education, allowing for the generally higher ability of the college student. He found that the rate of return on the investment in college education by urban white male students, including income foregone, was 12.5 percent in 1940 and 10 percent in 1950 before taxes. When the social cost of college education was added to the individual cost, the rate of return in both years was about 9 percent before taxes. Becker also estimated that the average rate of

return from investment of physical capital in incorporated and unincorporated business was approximately 8 percent before taxes during this period. He concluded that the direct returns from investment in college education did not justify increasing such investment in preference to increasing investment in the private sector of the economy. He did not attempt, however, to measure the benefits of college education to society.

Due (1959) advanced the concept that setting prices on government services equal to marginal costs would insure optimum output of those services only if there were no indirect benefits to the community in addition to those benefits accruing to individuals. According to Due, if there were indirect benefits from the investment, such as social benefits of education, the attempt had to be made to measure and include them, if the marginal cost theory of investment were to be validly applied to government investment in education. There is evidently great need for research to determine the social benefits of education.

Schultz (1961a), using techniques similar to Becker's, estimated that the return on the investment in college education in 1958 was 11 percent. He estimated the return on the investment in education for the entire labor force in 1957. He calculated that the return on the investment in elementary education was 35 percent, in high school 10 percent, and in college 11 percent, discounting for differences in ability and for unemployment and mortality. He then calculated the total years of education in the labor force, gave appropriate weights to each level of education, and estimated that the return on the total investment in education was 17.3 percent. Schultz, like Becker, included income foregone in the total costs of education. Both Becker and Schultz used income accruing to the individual as the measure of the investment return. Neither attempted to measure the value of the social returns from the investment in education and to add it to the individual return. Therefore, it is probable that the estimates of both Becker and Schultz on the return on the investment in education were low.

Musgrave (1959) advanced the thesis that social wants could not be satisfied through the mechanism of the market because those who did not pay could not be excluded from enjoying them. Under this concept education was not a social want because an individual was subject to exclusion, but it was classified as a "merit want" that benefited both the individual and society. Therefore, he said, education had to be included in the public budget because a sufficient production of education would not be accomplished by the market mechanism.

Horvat (1958), an English economist, developed a model for studying the optimum rate of investment. The usual method had been to determine the optimum rate of saving by applying the theory of utility maximization to the comparison of present sacrifices with future gains. Horvat related the social product to four factors: (a) investment in the material factor of growth, (b) investment in the human factor of growth, (c) personal consumption, and (d) communal consumption. He then assumed that

maximum personal consumption (c) and communal consumption (d) were the sole aim of society and developed a model to study the maximization of production or consumption through time instead of maximizing utility at a given point in time. His model included the concepts that the expansion of the economy depended on the quantity of investment, that the quantity of investment depended on the absorptive capacity of the economy, and that the absorptive capacity was limited by the human factor.

Horvat conceived the human factor to be a composite of (a) personal consumption, (b) health, (c) economic organization, (d) political organization, and (e) knowledge. His analysis indicated that there were limits in the increase or development of (a), (b), (c), and (d) beyond which the investment potential would not increase, but that there were no surpassable limits for the expansion of (e), the knowledge factor. Therefore the expansion of knowledge would continue to accelerate the expansion of the economy.

Moody (1960) studied the relationship between differential rates of investment in public education and growth of the private economy in the 48 states during the period 1945-57. He found that approximately 2 to 4 percent of the income of the people was invested in the public schools during this period. It had been hypothesized that although education would increase productivity over a long period of time, increased expenditures for education might temporarily harm the private economy. Moody found no significant relationship during this 13-year period between differential rates of investment in education and growth in the private economy.

Standard economic theories relating to alternative choices in the allocation of resources usually have been used to predict outcomes at a fixed point of time, assuming that labor and capital already were fully employed. However, the economy of the United States since 1900, with the exception of the war years, experienced chronic unemployment of both capital and labor. Despite this fact, the total economy was dynamic. A number of economists, including Hall (1960), experimented with models to predict outcomes through time from various uses of resources in an economy without full employment of capital and labor.

Additional References: Ainsworth (1960); Buchanan (1960); Cauley (1960); Hanson (1959); Kindleberger (1958); Schultz (1960); Tax Foundation (1960).

Individual Returns from Investment in Education

Houthakker (1959) computed the 1949 capital value of lifetime income according to years of schooling as follows: (a) eighth grade, \$124,105; (b) high-school graduation, \$175,160; and (c) four years of college or more, \$280,989. Miller (1960), using data for 1958, computed the total income for males from ages 18 to 64 as follows: (a) eighth grade, \$161,643; (b) high-school graduation, \$231,509; and (c) four years of college or

more, \$382,982. These studies indicated wide differentials in income by level of education, but these differentials could not be attributed solely to education. Neither researcher discounted for differences in ability, inherited wealth, or business opportunity at the various levels of schooling. Therefore, the differences in income actually due to differences in education probably were less than these studies indicated.

Income Elasticity of Demand

The income elasticity of demand for public-school education has usually been determined by comparing changes in expenditures per pupil in average daily attendance with changes in per capita personal income. A coefficient of one meant that a 1-percent change in per capita income had been accompanied by a 1-percent change in the per-pupil expenditures. When the coefficient was more than one, the demand was said to have been elastic; and when less than one, inelastic. McLoone (1961) found the coefficient of elasticity was .96 between 1929-30 and 1957-58, 1.45 between 1943-44 and 1957-58, and 1.34 between 1947-48 and 1957-58. Hirsch (1959) found that a 1-percent increase in per capita personal income between 1900 and 1958 was associated with only a 1.09-percent increase in expenditures for current expense plus debt service per pupil in average daily attendance. Thus both researchers concluded that over a long period of time the income elasticity of demand for education approached unity, but McLoone found that the elasticity of demand had been greater during recent years.

Schultz (1961a) used different methods in determining the elasticity of demand for education. His computations indicated the following: (a) The gross economic cost of education including income foregone was 2.9 percent of consumer income in 1900 and 10.3 percent in 1956. (b) The capital investment in the labor force was \$64 billion in 1900 and \$535 billion in 1957 in terms of 1956 prices, or an increase of 8.5 times. (c) The investment in physical capital was \$282 billion in 1900 and \$1270 billion in 1957 in terms of 1956 prices, or an increase of 4.5 times. He concluded that the demand for education had been highly elastic between 1900 and 1957.

The Marginal Utility of Education

The marginal utility of a commodity may be defined as the degree of desire for one more unit of it. Benson (1961) presented the following theoretical explanation of the amount of money spent on education: The increments of satisfaction from the last dollar spent for education equaled the increments from the last dollar spent for clothes, recreation, automobiles, and other goods. That is, if the household wanted maximum satisfaction from its income, no transfer of purchase from one kind of goods to another could increase satisfaction.

Galbraith (1958) challenged this theory as applied to householders' choices of government services in competition with goods produced in the private economy. He theorized that many wants originated with the producer rather than the householder, and that the producer artificially evoked these wants in the consumer through high-pressure advertising. This tended to deprive the consumer of maximum satisfactions because it caused him to ignore many of his urgent wants, especially those wants satisfied largely by government, such as education. Galbraith also postulated that the consumer, according to the mores of our society, tended to consider government-produced goods and services as a class inferior to privately financed goods and services. He concluded that the net effect of these and other factors had been to produce an affluent private economy and a poverty-stricken public economy resulting in a slowing of our economic growth rate.

Financing Public Education

Only a few of the many studies dealing with the financing of the public schools and colleges were reviewed.

Projected Educational Costs

Much attention was centered during the last three years on projecting the fiscal needs of public education during the next 10 years to meet the challenges ahead.

The Committee for Economic Development (1959) estimated an increase in revenue receipts from \$12.1 billion in 1958-59 to \$19.4 billion in 1969-70 in terms of 1958-59 prices. Barr (1960) estimated that revenue receipts for current operation would increase to \$21 billion in 1970-71 in terms of 1957 prices. Johns and Morphet (1960) estimated that public-school revenues would total \$29.7 billion in 1970-71 in terms of 1970 prices.

Johns (1960) analyzed recent projections of school expenditures for the next decade and concluded that a doubling of public-school expenditures would require a new pattern of support. All of these estimates had a ring of urgency to achieve a level of educational excellence implicit for the well-being of our society. Allen and others (1960) found three basic problems to resolve through future state fiscal policy: (a) the adequacy of the proportions of state support, (b) maintenance of effective equalization, and (c) maintenance of real expenditures in the face of rising prices.

Hirsch (1959) found that the overshadowing factors creating the present fiscal problem for public education were the importance of the teacher salary level, the increasing school population, and the use of the property tax as the main source of support.

Additional References: Allen (1959); Hutchins and Deering (1959); Southern Regional Education Board (1960).

Sources of Support and Their Allocation

Johns and Morphet (1960) analyzed the recent trends in sources of school revenue. They hypothesized that increased resistance to additional support for schools in the United States was due to the lack of correspondence between the property tax and the sources of income of the people.

Netzer (1960) studied the institutional obstacles to effective revenue policy in local and state governments. He found that the principal roadblock was in the process of authorization rather than in debt limits or inadequate organization.

McLoone (1961) threw considerable light on the problem of revenue for education by showing the elasticity of the property tax in relation to sales and income taxes. He estimated that revenue needs for education in the next decade would require an elasticity above 1.0, thus necessitating greater dependence on sales and income taxes for essential flexibility of support.

Nygaard and Gregg (1958) found a positive relationship between the shared income tax allocated to municipalities and the financial support of public education in Wisconsin, with a more favorable contribution by the state to municipalities than to public schools.

James (1961) reported on a pilot study conducted in five states to assess "the processes through which resources are allocated to the support of public education."

Additional References: Angel (1959); Bronder (1959); Chisholm (1959); National Education Association, Committee on Educational Finance (1961); Ovsiew (1959); Werner (1960); Wetherington (1959).

Search for a New Rationale

The most important development in the financing of the public schools during the past three years was the clarification of the incentive concept. This was interpreted basically as an equalized matching or equalized reward-for-effort feature that was incorporated in the foundation program to accomplish a more dynamic system of support.

The expression of this idea came as a link in a long chain of developments toward a rationale of somewhat conflicting principles. Ellwood P. Cubberley in 1905 proposed flat grants, subject to incentive modification (reward for effort) and supplemented by equalization to the poor districts. In 1922 Harlan Updegraff proposed a distribution of state funds in proportion to local tax effort. In 1923 George D. Strayer and Robert M. Haig enunciated the model of the equalized foundation program of support. In 1930 Henry C. Morrison advocated complete state support of public schools.

Paul R. Mort developed the "wholesomeness approach" to finance over a quarter of a century of research. In this approach he questioned "the

wholesomeness of conditions for producing good education." Mort and others (1960) viewed this concept as the next goal for improving state fiscal policies. They added a mild hint that complete state support, as advocated by Morrison, might be next in line. Mort's wholesomeness approach incorporated, with other things, the incentive concept.

The rationale of the incentive concept in the foundation program was expressed in certain developments of state fiscal policy within the last decade, notably in Wisconsin, Rhode Island, and Maryland. William P. McLure in 1955 proposed supplementing a traditional type of foundation program with a state-equalized matching grant based on local tax effort. Arvid J. Burke in 1957 observed that central finance should not place complete emphasis on equalization but should release local resources for the exercise of "initiative by the willing and able."

In the most recent study, Mort (1960) proposed a plan for applying this incentive concept in Delaware, where the foundation program had been predominantly state supported for 40 years. Local support had been supplementary and minor. His proposal opened the way for greater local support, with additional state funds above the foundation to help districts achieve a high quality of education if they were willing to make the effort.

Mort and Furno (1960) developed a theoretical model for the explanation of forces that shape school quality. The prominence of the finance factor made this study especially relevant to the foregoing theories.

Additional References: D'Ascoli (1957); North (1959).

Higher Education

The literature on financing higher education dealt mainly with considerations about tuition, federal support for public institutions, and federal support for private institutions.

Kidd (1959) and Weaver (1960) evaluated the effects of recent programs of federal financing of research on the operations of universities. Since the programs were still in the stage of early introduction, these studies lacked the perspective that might have been obtained through analysis over a longer period of time.

McLure and others (1960) presented a new concept for organizing and financing junior college education, with particular attention to technical fields. They concluded that the magnitude and complexity of needs could not be met short of state-wide planning, organization, and financial support.

Additional References: Blum (1958); Harris (1960); Langelier (1959); Tickton (1960).

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CHAPTER VII

Managing the School Plant and Business Affairs

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PUBLICATIONS on school plant and business affairs were produced in ever greater quantities during the past three years. The limited number which were based on research or are of value in other ways to the research worker are reviewed here.

Basic references and bibliographies are noted in the opening paragraphs of each of the first two sections. A general critique of the research is presented as the third and last section.

School Plants

Bibliographies and Basic References

More books on the school plant were released during the 1950's than in any other decade in history. General source books of significance to the researcher were produced by the American Association of School Administrators (1960), McQuade (1958), and Strevell and Burke (1959). Gabrielsen and Miles (1958) edited the first comprehensive volume on designing facilities for sports and recreation. Besides its authoritative general plant planning guide (1958b), the National Council on School-house Construction published paperback volumes on elementary schools (1958a), duplicating much of the material in its general guide, and on facilities for higher education (1960).

The biennial school-plant bibliography in *American School and University* was revised by Pharis (1959). *American School and University* (1959b) issued a topical listing of 180 manuals, booklets, and bulletins on 45 different school-plant topics published by 38 state departments of education.

Characteristics of School Plants

The editors of *American School and University* (1960) conducted the eleventh annual national building survey on characteristics and costs of new buildings for public and private schools and colleges. For the first time since 1952 the total new facilities constructed during 1959 fell below the total for the previous year.

Manla (1960) revealed data on 135 college student unions built from 1950 through 1960 and explained the philosophies behind such units.

American School and University (1959a) described 570 residence facilities at 1264 colleges and universities constructed from 1950 through 1958.

The research included in U.S. Office of Education documents was based primarily on data gleaned from questionnaires using nationwide samples of varying size and validity. Several reports revealed the status of selected aspects of school plants or of agreement on what was "desirable." Martin (1960) catalogued state recommendations for elementary and secondary science and mathematics facilities. Obourn and others (1960) described the actual status of these spaces in the public high schools in 1958. J. L. Taylor (1958) depicted the selection, development, and utilization of school sites. Taylor, Gore, and Gabbard (1961) surveyed 343 public schools to obtain opinions of principals and teachers on desirable characteristics of areas for early elementary education.

Planning and Design

Ellena (1959) verified the commonly held assumption that a marked variation existed in the numbers and ages of children that could be predicted for different types of dwelling units in new housing developments. Peterson (1959) concluded that the survival-ratio technique for predicting pupil population was more reliable than other techniques, although he recognized its limitations.

Braun (1960) noted that co-operation between school people and city planners in planning new school buildings was an established procedure in about half the large cities. Stokes (1959) suggested the pupil-minute measure of room utilization and reported a high degree of utilization of pupil seating areas but limited utilization of other areas in the room. Pfleger (1959) found that surveys of facilities for colleges and universities were remarkably uniform in the 29 states examined and that they did not depart much from the pattern established in 1929. Wilsey (1960) substantiated the wisdom and economy of purchasing school sites at least two years in advance of need. Sanders (1958) explored the influence on instructional programs in elementary schools of experimental furniture such as pupil work centers.

Chapman (1960) executed sketches and diagrams of spaces to facilitate teaching with educational television. Clinchy (1961) presented floor plans of 10 school buildings designed to facilitate team teaching. Gibson (1960) described experiences with stock building plans for California systems.

Additional References: Higgins (1958); Knezevich (1960).

Cost and Economics

The American Standards Association (1958) and Reason and Tankard (1959) released basic definitions and methods of computing area and

volume of school buildings, which promised to help reduce confusion in comparing building costs. Capital outlay expenditures in 1955 for colleges and universities were, according to Bokelman and Rork (1959), more than double those for 1951.

Pierce (1959) prepared one of the most objective and comprehensive studies of school-plant costs. Largent (1960) showed that portable classrooms, as supplements to permanent rooms, were economical. McQuade (1958) included detailed comparisons of costs for various types of windows, heating and ventilating systems, lighting, structural framing, and interior partitions.

Hutchins and Deering (1959) observed that 79 percent of the costs of public-school facilities came from local funds, 9 percent from state funds, 4 percent from federal sources, and 8 percent from state school-building authorities. North (1959) identified seven characteristics of a sound program of state support of capital outlay.

McLean (1960) reported a significant but inverse relationship between compactness of building design and subsequent expenses for operation and maintenance. Zimmerman (1959) analyzed 20 Los Angeles elementary-school buildings and ascertained a significant correlation of $-.46$ between initial cost and subsequent maintenance costs. Further research along these lines would help shed more light on what constitutes true economy in school-plant design and construction.

Additional References: Educational Facilities Laboratories (1960); Faust (1960).

Maintenance and Operation

Finchum (1961) collected from many published sources the ideas, practices, and suggestions pertaining to custodial requirements and practices. Like much writing in this area, this document draws from limited empirical observations and personal success stories of practitioners, rather than from well-designed research studies. On the basis of an excellent study of school fires, the Building Research Advisory Board (1960) concluded that "much must still be learned about the way fires start and grow, about the effects of building shape, mass, construction, and layout on fire growth and spread." Chorlton (1960) studied the effect of glare in classroom illumination.

School Business Management

Basic References

One general basic reference on school business management and two more specialized volumes appeared to assist the researcher. Knezevich and

Fowlkes (1960) treated a broad range of topics and attempted to bridge the gap between public-school and governmental accounting and auditing. Ovsiew and Castetter (1960) provided a comprehensive analysis of school budgeting, and Tidwell (1960) concentrated on public-school fund accounting.

The U.S. Office of Education released two more documents in its series of state educational records and reports which promised to help establish uniformity in terminology and thus influence cost comparisons and research. Samuelson, Tankard, and Pope (1959) completed a guide for the financial accounting for school activities, and Reason and Tankard (1959) did the same for property accounting.

The School Business Official

Status studies of the school business official were reported by Campbell (1960) for cities of 100,000 or more; by Hagen (1960) for New Jersey; and by Ryan (1958) for Catholic high schools. It was well established that typical business managers were in their late forties, that their salaries and titles varied, and that they were not found in many small school systems. Additional research of this type will be sterile unless new concepts and techniques or broader and more valid sampling are employed.

Additional Reference: Hill (1960).

Budgeting and Accounting

Studies of school budgeting continued to depend on the questionnaire method and only to describe existing practices. Thus Bracken (1960) revealed current practices in preparing and presenting school budget messages in 52 percent of the very large cities. Bowermaster's study (1959) of budget practices in Illinois confirmed the finding that there was lack of uniformity in budget preparation. Godbold (1960) discovered that faculty involvement in budget development in large privately controlled universities was increasing.

Lohnes (1958) developed a means of predicting school operating budgets, by which approximately half of the variability in the rate of change in operating budgets could be traced to size of system and its rate of growth. This study had potential for developing a conceptual framework for future research on the antecedents of school spending.

Additional References: Baum (1960); St. Clair (1960).

Costs and Cost Analysis

Hirsch (1959) applied the concept of income elasticity of education for a better understanding of comparative cost analysis. The National

Education Association, Committee on Tax Education and School Finance (1959) prepared an excellent summary of 40 years of research on the cost-quality issue in education.

Shelton and Gray (1960) indicated some of the pitfalls in comparing costs and adjusted cost data for unified and nonunified elementary districts in California. Huls (1958) concluded that states needed to re-examine the legal limitations on school expenditures.

School Management (1960) constructed a cost-of-education index based on Furno's previous work. Expenditures for many budget items for 1958-59 and 1959-60 were itemized for a weighted sample of 583 school districts.

Bokelman (1959) received data on costs and cost trends from 1015 of the large public and private colleges and universities. This U.S. Office of Education document is part of an annual series which provides normative data to facilitate budget making and other planning for institutions of higher learning.

Cirola (1959) reported great strides in the past seven years in Pennsylvania schools in providing fringe benefits for professional employees. Egly (1959), studying cities with populations of 100,000 or more, stated that practices in granting fringe benefits to classified employees varied widely but that the granting of such benefits was accepted nationally by schools as well as by business and industry.

Additional Reference: Briggs (1959).

Insurance

Interest in school-insurance practices (particularly fire or property insurance) was evident from state-wide studies of school property insurance practices in Arkansas, Iowa, Missouri, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, and Texas. The conclusions from these studies had a familiar ring: school systems were "paying too much" for fire insurance; most of them could have saved money by adopting "desirable practices"; larger systems employed "better" insurance practices than did smaller ones; and competitive bidding was a "desirable" way to award school insurance contracts. Further state-wide fire insurance studies would add little useful information. Finchum and Viles (1959) issued a guide to managing local school-insurance programs.

Salmon (1958) continued and revised a school fire insurance analysis started in 1921. His data were based on the 1946-55 period and included 378 United States and Canadian school systems, each of which employed a member of the Association of School Business Officials. There was no pretense that it was a random or representative sample. The loss ratio (relationship between insurance premiums paid and losses collected) for the 1946-55 period was 29.53 percent and varied little from the loss ratio in previous surveys. The lack of comparable samples and the differing time periods can explain discrepancies of the loss ratio reported in Salmon's

study with the loss ratio reported in various state-wide studies and in Viles's (1956) nationwide survey.

Additional References: Bishop (1960); Brent (1959); Crim (1959); Elsea (1960); Leathers (1960); Mills (1958); Schaerer (1959); Schneider (1958); Simpson (1961); G. E. Taylor (1958); Wolf (1960).

Cafeteria Management, Purchasing, and Transportation

Published research in cafeteria management is practically nonexistent. George and Heckler (1960) authored a general source book on school food services.

State-wide studies on purchasing procedures were reported by Fullmer (1960) for Oregon, by Shields (1960) for small schools in Texas, and by L. V. Taylor (1960) for Indiana schools of a certain size.

Most transportation studies concentrated on costs, insurance, or practices. Parrish (1959), in a New Jersey study, reaffirmed that district-owned buses were more economical than contract buses. Transportation cost analyses were obtained in Pennsylvania by King (1960); in selected counties of Michigan by Woodby (1960); in Missouri by Hicks (1958); and in Oregon by Mayfield (1958). Carothers (1959) compared records of student and nonstudent school bus drivers and found them equal in "efficiency" and safety.

Additional References: Council of Chief State School Officers (1959); Kingsley (1959); Miller (1960); Voskuil (1959).

Critique

Research in school-plant and business affairs was overly preoccupied with repetitive status or descriptive studies of narrow scope, and was unrelated to conceptual frameworks or predictive devices. Little of it was imaginative or inspiring. Few new concepts and techniques were developed in the past three years. Accidental rather than planned random or representative sampling was the rule, and recommendations and generalizations often went beyond available evidence.

Much of the research in these areas settled into a sterile rut born of repetition, where it yielded "interesting" and isolated facts but few new insights. It lacked a conceptual framework to unify separate research efforts and promote more profound understandings.

There were some encouraging signs in the past three years, however. One was the appearance of publications in business and school-plant management devoted to uniform definitions and standards. These are valuable tools for research. Another was the research on relationships between planning, design, or construction of a school plant and subsequent costs of operation and maintenance. Budget studies were aimed at

ascertaining factors which affect future patterns of expenditures, and these also deserved commendation.

The more difficult but significant research on the effect of school plants or business procedures on the learning and teaching process remained undone.

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Growth, Development, and Learning

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FOREWORD

The major premise guiding the selection and organization of material for this issue has been the conviction that research in growth, development, and learning could be interpreted most meaningfully to the educational specialist if considered in relation to classroom learning. Developmental trends during the life span—particularly those of a cognitive nature, but not excluding trends in social, emotional, and personality development—are obviously relevant. Since these trends influence the cognitive, motivational, interpersonal, and social determinants of classroom learning at every age, they must be taken into account by all persons concerned with teaching and curriculum development.

Perceptual and cognitive development are emphasized here more than in previous issues on growth, development, and learning, because they have greater relevance for cognitive aspects of classroom learning than do social, emotional, and personality development. After a quarter-century of virtual neglect, during which educational and developmental psychologists have emphasized personality and social development in teaching and research, cognitive development has emerged as an important focus of research and general interest for the educator. The traditional chapter on physical growth was omitted from this issue: it was felt that such specialized topics as physical growth, motor development, nutrition, congenital disorders, and prenatal development are not specifically relevant to the more general aspects of development the educator is concerned with; moreover, these topics are more closely related to special education, physical education, and school health programs.

Consideration of both the *Zeitgeist* and the trends of current research demanded that greater emphasis be placed in this issue on learning. Coverage within the field of learning, however, was restricted to what is generally regarded as the major cognitive aspect of classroom learning, namely, *meaningful* kinds of cognitive learning. It is true, of course, that some classroom learning, such as foreign language vocabulary and the symbols used to represent the chemical elements, approach the rote level, but this type of learning is a very small part of the curriculum. In any case, the associations formed under these circumstances are not wholly arbitrary, as in the learning of paired associates, but involve the learning of representational equivalence, i.e., that particular symbols are equivalent in meaning to already meaningful concepts in cognitive structure.

The kinds of learning reviewed in this issue, therefore, include, for the most part, (a) the meaningful acquisition and retention of information, concepts, and propositions; (b) evaluation; and (c) thinking and problem solving. Also included are the long-term outcomes of school learning, i.e., knowledge of subject matter and ability to use such knowledge in rethinking and problem solving. Nonverbal intuitive understanding of re-

lationships and other nonverbal types of symbolic learning are considered, as well as meaningful verbal learning.

Research on rote, noncognitive, and simple discriminative learning was excluded from consideration, first, because the relevance of such findings for classroom learning is at best only indirect and tangential, and second, because their inclusion would have so broadened the scope of the field that coverage would necessarily have become superficial, fragmentary, and unsystematic. It could be argued, of course, and with considerable justice, that relatively few well-controlled studies of meaningful learning have been conducted. The Committee, however, felt that to review systematically the more directly relevant research in the field was preferable to padding the issue with a miscellaneous assortment of rigorously controlled studies of questionable relevance.

By setting the standards of scope, relevance, and significance implicit in this choice of focus and by providing a programmatic model for systematically ordering relationships within this area of knowledge, it is hoped that this issue can influence, as well as reflect, research trends in growth, development, and learning.

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CHAPTER I

Perceptual and Cognitive Development

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THIS CHAPTER is devoted to studies in the development of the cognitive processes involved in perceiving, thinking, and learning. It focuses on how and when these processes evolve, the factors that influence their formation, and their effects on the intellectual functioning of the child.

Development of the Perception of Physical Stimuli

During the past decade there has been increasing interest in the effects of central and intervening processes on the act of perceiving. The construction of theories and models of perceptual mediation has not been matched by empirical research, however, and a number of exciting hypotheses have been put forward that are still in need of adequate testing. In the absence of any broad, longitudinal studies, several reviews will be noted before empirical investigations are discussed.

Wohlwill's (1960a) analysis was limited to experimental investigations involving noncognitive, nonconceptual tasks. A decrease in the perceptual assimilation of objectively different stimuli was noted as a correlate of increasing age, while the distorting effects of contrast were found to increase. Apparently, as the child becomes better able to discriminate, the very contrast between the differentiated stimuli of which he has become newly aware serves to produce distortions. This suggests a growing relativism and a corresponding reduction in the importance of the absolute properties of the stimulus. Other trends noted by Wohlwill were a tendency, increasing with age, to relate a stimulus to its spatial framework and a sharp drop in errors of spatial localization of body orientation. In all instances the improvement of perceptual discrimination was accompanied by the onset of centralized controls, which stabilized and simplified perceptual patterns, sometimes at the expense of objectivity (veridicality). The need for this simplicity can be inferred from another trend identified by Wohlwill, who noted that the young child requires more redundancy in a pattern to perceive it correctly and prefers perceptual modes that provide a minimal scope of information. The question of whether or not age, learning, and the emergence of central controls and regulatory mechanisms actually increase veridicality was singled out as the most significant open question to be faced.

Bevan (1961) posed a theory of the evolution of perceptual frames of reference that was founded primarily on differentiation rather than association. He pointed out that perceptual development is characterized by pro-

gressive refinement, definition, and specificity rather than a building up of associative links.

Pastore (1960) stated his bias unequivocally: "All the significant aspects of perceiving are unlearned." He pointed to the perceptual similarities between man and lower animals, which exist "despite obvious differences in anatomical structures and in modes of responding to the environment." Among the modes cited were the perception of form, depth, apparent movement, illusion, size, and brightness constancy. Pastore noted that the extremely early onset of many perceptual modes almost ruled out the possibility of perceptual learning. He allowed that both learned and unlearned perceptual behavior may play a role in development, but argued that "at most, learning factors must be assigned a secondary role; they may exert an influence only when the perception-to-be-modified is already an existent one."

The three reviewers agreed that early perceptual development is chiefly a function of maturational change and the increasing capacity to differentiate stimuli. But from this point on they diverged. Wohlwill stressed associative learning and perceptual integration; Bevan, dissociative learning and perceptual differentiation; and Pastore, neurological maturation and preformed perceptual patterning. Unfortunately, none of the reviewers was concerned with the perception of stimuli which have strong links to conceptual and value systems, despite the fact that perceptual growth is ordinarily interwoven with conceptual growth. Where stimuli have been abstracted from a meaningful context, the act of perceiving may be deprived of certain conative and other conditions that normally influence the shaping of a percept.

Role of Stimulus Properties

Developmental studies of form perception have persistently produced the disturbing finding that common objects, though highly complex in form, and irregular abstract forms (Piaget called them "topological") are invariably perceived and discriminated more readily by young children than were Euclidian shapes. Page (1959), in a replication of an earlier study by Piaget, found new confirmation for the "primacy of topology": preschool children were nearly three times as successful with haptic recognition (feeling cutout forms without seeing them) of topological forms as of simple geometric shapes such as squares and triangles. He offered three hypotheses: (a) Identification of topological forms requires more primitive neuromuscular actions than do more regular shapes. (b) Geometric forms are less frequently found in nature and thus are less familiar. (c) Such topological qualities as closure, separation, proximity, and continuity provide immediately available perceptual cues for the younger child who has not yet mastered the essentially logical relationships found in Euclidian forms. The familiarity hypothesis seems the most parsimonious, and it was

supported by evidence of early recognition of common objects regardless of shape.

Gibson and other researchers found, on the other hand, that for some types of perception familiarity with stimuli was totally unnecessary. Gibson and Walk (1960) ascertained that most terrestrial creatures were able to identify and avoid an abrupt drop-off, or "visual cliff," without prior experience. The subjects were placed on a glass runway which afforded two exits. One exit was reached over a sharp drop visible through the glass and made more apparent by a textured pattern directly under the runway which was identical to that at the bottom of the "cliff." The alternative exit was shallow. All animals capable of locomotion, including the infant, favored the shallow exit significantly more often than the "cliff." These findings supported the existence of at least some degree of preformism in perceptual discrimination.

To test the saliency of the perception of "depth-at-an-edge," Walk and others (1959) exposed rats from birth to three-dimensional cutouts of geometric forms mounted inside their cages. For control animals the same forms were painted on rectangular panels. At maturity, the rats familiar with the three-dimensional forms performed significantly better than did the others in learning tasks requiring discrimination among the forms. This was interpreted as additional evidence of the primary perceptual saliency of "depth-at-an-edge." Stevenson and McBee (1958) obtained similar results with four-year-old and six-year-old children, who learned to discriminate stereometric objects and patterns more rapidly than planometric.

If certain properties of visual stimuli make some stimuli more noticeable than others, what are these properties, and what is the source of their saliency? To find answers, Gibson (1961) asked four-year-old and eight-year-old children to match a standard printed symbol with its mate, which had to be selected from 11 similar symbols, each of which differed in one feature from the standard. To the extent that selecting the appropriate mate was easy, the feature that had been varied was regarded as distinctive. Error curves dropped sharply from the four-year-olds to the eight-year-olds in discrimination of all features, although the shapes of the error curves differed considerably, because certain features were consistently more distinctive than the others.

Graham, Berman, and Ernhart (1960) found no support for Werner's hypothesis that the distortion of perception of younger children toward excessive closure, simplicity, and symmetry decreases with age. They analyzed preschool children's reproductions of simple geometric forms and concluded that the properties of the stimulus itself probably were more closely related to the amount of perceptual error than was the age of the child. However, since perceptual variables were inferred from the children's drawings and since motor performance variables were not controlled, these results should be interpreted with some caution.

It was evident in these studies that very early in development, perhaps too early for learning to have occurred, the organism perceived different

cues with varying degrees of sensitivity. Apparently, in some instances, certain objective properties of a stimulus innately augmented its saliency. In other instances, however, early exposure to particular stimulus forms rendered the organism more sensitive in the discrimination of these forms. These facts have obvious significance for education, particularly with regard to readiness for learning.

Role of Central Processes

The regulatory mechanisms governing perceptual constancy in the judgment of size and auditory localization were also examined for developmental trends. Cohen, Hershkowitz, and Chodack (1958) found that younger subjects were either less certain or more diffuse than older subjects in their judgments of the comparative size of two stimuli. Judgmental accuracy of older subjects increased in relation to that of younger subjects as direct visual comparisons were made more difficult. It was concluded that the development of size constancy was a critical factor. Similar findings were obtained by Liebert and Rudel (1959) in their study of auditory localization under body-tilt conditions. Blindfolded older and younger subjects did equally well in localizing a sound source, but when the body axis was tilted, the older subjects overcompensated more than the younger ones in their localization judgments. One may again note the increasing control exercised by central processes with increasing age, particularly when data are scant, ambiguous, or contaminated by interference.

London (1958) presented normal and maladjusted boys aged 4 to 15 with picture cards portraying a gradual transformation of an initial figure into another markedly different one. Among the normal boys, the older subjects made more appropriate discriminations of changes in the card series than did the younger ones. Among the maladjusted boys, the effect of age on discrimination was not as clear, and they made both earlier and later generalizations from perceived shifts than the normal boys did. London's interpretation was that maladjusted children generalized more than normal children and that they made both premature and delayed generalizations. Two corollary principles were that the development of normal generalizing was toward a balance between much abstraction from little data and little abstraction from much data and that the mechanism that maintained this balance was related to socioemotional adjustment.

Ames's (1960) longitudinal study of *Rorschach* protocols for subjects aged 2 to 10 showed a steady decline with increasing age in the objective use of form and detail as organizing stimuli, in sharp contrast to steadily increasing scores on every other major variable. Here was evidence of the increasing subordination of external stimuli to the control of central processes in the determination of meaningful perceptions. But this trend was only part of the picture. Set was apparently a critical factor. London's (1958) subjects approached objectivity through greater discrimination with

increasing age, while Ames's moved in the same direction through increased central organization and control. In the first instance, the set was to make discriminations; in the second, it was to react in an undefined way to a stimulus.

Development of the Perception of Social Stimuli

The act of making social judgments involves more than simple perceptual discriminations. The data available to the perceiver are often sketchy and ambiguous in relation to the judgments he makes from them and leave considerable room for organization and inference. Gollin (1958) analyzed the social judgments of children aged 10 to 17 about a fictitious child portrayed in motion-picture vignettes. The developmental trend was toward the increasing use of inference (going beyond the actions shown in film) and concept (accounting for diversity of behavior in a single explanatory system). Inference came into use earlier than concept, but both occurred relatively late. At age 10, only 18 percent of the boys and 21 percent of the girls used inference, and 2 percent of all subjects used concept.

Jahoda (1959) probed the development of social-class discrimination, using an interesting picture-matching technique to assess the ability to group people on the basis of social-class symbols. The trend from 6 to 9 years of age was from early global subjective judgments to increased utilization of specific objective indexes. Both perceptual discrimination and learning were seen as determinants of accuracy.

Picture-card sorting, doll assembly, and story completion were used by Stevenson and Stewart (1958) to study the development of the perception of racial differences. White and Negro three-year-olds had difficulty making racial distinctions, but by the seventh year almost all subjects could discriminate easily.

The most striking aspect of these studies of social perception was the relative lateness in development at which the objective interpretation of social data began to displace subjective social judgments. Because of powerful ego-related (subjectivistic) central controls and the scarcity of unambiguous data, social perception probably never reaches the levels of veridicality achieved in physical perception.

Development of Intelligence

Recent studies of mental growth tended to emphasize increasingly the qualitative aspects of intelligence. This shift, no doubt, reflects the spreading influence of the theories of Piaget and Guilford, who have focused on the *process* of thinking rather than the *potential* for it.

Operational Intelligence

Inhelder and Piaget (1958) and Piaget and Inhelder (1959) set forth the results of 20 years of intensive study of the growth of logical thinking.

The behaviors of nearly 3000 children aged 2 to 16 were examined as they performed a variety of problem-solving tasks. Elementary logical structures were traced from their origins in infancy through the period of transition (around adolescence) from concrete to abstract and formal logical thinking. The studies used the now familiar clinical method that involves interviewing the subjects at work on a task. The aim was to obtain increased insight into cognitive acts from the child's own verbal reports.

The dominant changes with growth were toward both a desubjectification of thought and an increased co-ordination and purposeful direction of it. Children were found, with increasing age, to remove themselves from total immersion in their cognitive world to a position outside it, from which they could experimentally manipulate variables and perform heuristic operations. These operations were seen as steadily approaching the structure of formal logical systems.

Inferences about each subject's level of cognitive functioning were drawn directly from the interview protocols, but the criteria by which responses were assigned to one level or another were not always clear. The reader was expected to accept the authors' interpretations of the data, since selected protocols were given only as illustrations of the authors' formulations. The extent to which the data actually justified the formulations could not be ascertained.

The lack of normative data all but obscured the fact that Piaget and Inhelder found differences in the modal age of children at a given stage on two different tasks. Apparently, the age level for the attainment of a given stage was task-specific rather than general, and a child could operate at stage 1 on one task and at stage 2 on another. By imbedding their findings in lengthy and ponderous discourses and failing to present their data systematically, the authors left themselves vulnerable to such misinterpretations as the belief that they had constructed a rigid age-scale of cognitive development.

Between the major operational stages, Piaget and Inhelder found it necessary to insert many transitional stages which weakened the argument for discontinuous stages. The trends, rather than the stages of cognitive organization, seem to be the more defensible hypotheses to emerge from the studies. Longitudinal studies would have provided a far better test of the hypothesis of discontinuity, in that qualitative shifts could have been observed rather than inferred.

Creative Intelligence

J. P. Guilford and his associates' tests tap such factors in creativity as ideational fluency, spontaneous flexibility, and originality. Using adaptations of Guilford's instruments and a few of their own design, Torrance (1961) and his associates charted the development of creative abilities through the elementary-school grades. Children in rural and urban schools and in public, private, and parochial schools were tested. Everywhere cre-

ativity increased steadily through grade 3, dropped off sharply in grade 4, gained slowly in grades 5 and 6, and made another, slighter dip in grade 7. The same pattern was seen in the fluency of question-asking on the "ask-and-guess" test but not in the formation of hypotheses. In all cases, it appeared that the "fourth-grade slump" was characteristic of divergent and creative activity but not of convergent problem-solving performance.

While this puzzling pattern may have indicated the presence of discontinuous shifts or stages in the development of creative abilities, too little was known about the instruments to draw any conclusions. Torrance reported on plans to continue the investigation of this phenomenon using a broader measurement base.

Development of Concept

Most recent studies on the growth of particular concepts reflected Piaget's influence. They were efforts to test or confirm his findings, to apply his theory to new kinds of concepts, or to employ new methods of mapping concepts he had explored.

Mathematical and Physical Concepts

Wohlwill (1960b) studied the ordered sequence of developmental changes in the child's concept of number. By scalogram analysis, he sought, through a behavioristic interpretation of symbolic processes, support for Piaget's findings. Subjects worked problems designed to elicit "conceptual response to the dimension of number at progressively more elaborate levels of symbolic mediation." His findings confirmed Piaget's. More significantly, Wohlwill concluded that the abstract concept of number arose mainly in the child's cumulative general experience and that its course was affected little or not at all by specific practice with numbers, as in counting.

Lovell (1959) and Lovell and Ogilvie (1960, 1961) attempted to test Piaget's findings on the emergence of conservation—of the child's awareness that "X is constant regardless of factors A, B, and C." They repeated his "experiments" on the conservation of substance and weight and devised some of their own, but they admitted failure to test his claim that, once the child reasons logically in concrete situations, conservation may be inferred. This failure may have stemmed from the authors' shaky hold on Piaget's logic. Also, their failure to specify definitions—his or their own—of "conservation," "reversibility," and other key terms casts doubt on the validity of their findings. Nevertheless, given benefit of the doubt, their findings merit attention.

Lovell (1959) confirmed Piaget's developmental stages, but Lovell and Ogilvie (1960) found, contrary to Piaget, that substance is *not* conserved for all time upon attainment, but is conserved only in very specific kinds of situations at first and then expands to others with experience and maturation.

tion. Lovell and Ogilvie (1960, 1961) also pointed out clearly the problems of interpreting what children mean or understand in conversation. They noted that adult-child communication was hampered not only by much verbal confusion in children under 12 but also by the very disparate conceptual systems through which adult and child viewed the things and events which they referred to by the same words.

Annett (1959) compared and analyzed groupings and explanations made by 303 children aged 5 to 11 and 42 adults aged 18 to 73 in classifying common objects. The main developmental changes were in methods of explanation, which were related to both IQ and age. She concluded that her findings supported the "dispositional view of concept formation," held by Piaget and others, "in its implications that concepts may be attained through stages not apparent upon consideration of their final form in adults."

Moral Concepts

Durkin (1959a, b; 1961) tested Piaget's claim that reciprocity (an eye for an eye) as children's basic principle of justice holds firm with age, but with growing concern for equity. Attempting careful cross-cultural matching, she interviewed American subjects about hypothetical episodes of physical and nonphysical aggression. She concluded that Piaget's findings, derived only from situations of physical aggression, could not be generalized; that he minimized environmental effects upon ideas of justice; and that his assertion that a concept of "justice" grows in proportion to peer contact, independent of adult influence, was invalid.

Jahoda (1958a, b, c) studied West African children's moral concepts. He disproved Piaget's prediction that animism, as reflected in concepts of immanent justice, would persist to higher age levels in primitive societies than among more civilized peoples. In a critical survey and criterion study of cross-cultural research, he concluded that Havighurst and Neugarten were in error in their confirmation, based on Hopi Indian children, of Piaget's prediction.

Social Concepts

Danziger (1958) interviewed 41 Melbourne school children aged 5 to 8 on their notions of "rich" and "poor," on the uses of money, and on the role of "the boss" at work. He found Piaget-type stages in the development of concepts of economic relationships. Allowing for cultural bias, he concluded that the parallel findings between this study and an earlier study on concepts of kinship "raise the possibility that there may exist some truly general features in the growth of social concepts."

Development of Thinking Processes

Productive studies on the development of particular kinds of thinking focused mainly on language and association processes and on physical and

quantitative reasoning. Piaget's influence was directly evident only in the latter area.

Brown and Berko (1960) gave 60 children in grades 1 to 3 and 20 adults at the Massachusetts Institute of Technology a word-association test in which nonsense stimulus words were associated syntactically. Results confirmed the hypothesis that in language development, "syntactic similarity becomes an increasingly important determinant of word association." Thus the child who once associated nouns with adverbs as in "rain—hard" or "street—wet" eventually matched nouns with nouns, as in "rain—sleet" or "cat—dog." The authors concluded that "it seems certain that homogeneous scores for free association are related to homogeneous scores for usage."

Braine (1959) made a rigorously formal critical examination of Piaget's theory on the development of thinking processes involved in measurement and in the discrimination of order. He found that the child's attempts at linear measurement may reflect his knowledge of measuring techniques as much as it does his ability to reason logically about length. This finding rendered questionable Piaget's diagnosis of the child's ability to make inferences basic to measurement solely on the basis of his performance in measurement tasks. Braine also found that reward, sex, and previous experience in ordering tasks were unrelated to success in measuring. His one *gaffe* was his interpretation of Piaget's age citations as age stipulations; consequently, he erroneously ascribed to Piaget the claim that "the ages of transition are, in themselves, genetically predetermined."

Mogar (1960) confirmed Piaget's stages in the growth of the child's concept of physical causality. For her younger subjects (under eight years), experience in causal reasoning "seemed to have positive effects"; it follows that the development of certain reasoning processes may well be subject to educational acceleration.

Elkind's (1961) systematic replication of Piaget's study on the development of quantitative thinking resulted in confirmation of Piaget's "age-related hierarchically ordered stages of success in comparing quantity." Subjects were given beads, sticks, and liquids to consider in their assessments of quantity. Elkind, in referring to the use of general quantitative terms such as "number and amount," hinted at a possible weakness in his and Piaget's studies: "Because of this ambiguity of language, it was assumed that the verbal directions did not provide clues to the types of quantity that had to be compared."

Development of Learning Abilities

Meaningful learning and the build-up of conceptual systems rely heavily on the formation of associations. There were two investigations into factors related to the development of associative learning. Bousfield, Esterson, and Whitmarsh (1958) used a word-list recall task to determine the amount of associative clustering and the preferred basis for clustering (*color versus*

function) used by children between third grade and college. The finding that older subjects manifested a greater amount of conceptual clustering and better recall than did younger subjects suggested increasing integration of cognitive structure with age. Contrary to the authors' predictions, the use of color did not decrease with age as a sorting criterion. It was concluded that color is a highly complex determinant of responses and that its effect on the child's mode of associative clustering could not be analyzed independently of other determinants. The authors further suggested that the basis for any associative clustering might well be a function of the alternative bases for judgment available at the time the association is made and that attitudes or sets might have an appreciable influence.

In a study of paired-associate learning by Akutagawa and Benoit (1959), age was found to be a far more significant factor than IQ in the ability to learn very simple associations, although the importance of intelligence did increase as the learning task became more complex. Support was seen in these findings for Hebb's theory that lower levels of associative learning are determined more by the gross amount of previous experience than by intelligence. The ability to form new associations, like so many other cognitive abilities, seems to develop as a function of experience, probably because experience expands the cognitive structure which, in turn, facilitates the learning of new associations. While Hebb's theory regarding the environmental shaping of neurological structures and functions has yet to receive clear empirical support, one can make a convincing case for the importance of experience as a determinant in the growth of learning ability. Hunt (1961) has made just such a case in his extensively documented synthesis of Hebb's and Piaget's empirically derived formulations.

Dissociation also is a kind of learning, and the ability to make appropriate semantic differentiations among dissimilar but related concepts apparently depends on how related the concepts have become in the course of the child's experience. Ervin and Foster (1960) found that dimensions such as size, weight, and strength and social attributes such as those described by "good," "pretty," and "clean," which are learned as correlated variables long before the child can clearly differentiate them, become so linked with each other semantically that the concepts they represent remain very difficult for the child to keep distinct. This seems an important phenomenon for further study. It may well be that conceptual structures growing out of early empirical experiences influence the entire course of subsequent language development.

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CHAPTER II

Personality and Social Development: Family and Peer Influences

JEROME KAGAN and HOWARD A. MOSS

RESEARCH in personality development during the past three years was concentrated on a more manageable number of variables. Areas of particular concentration were (a) the motive-related responses of aggression, dependence, achievement, and sex-role identification and (b) the effects of parental control, affection, and personality on the development of the child's needs and patterns of social interaction. The influence of the peer group was also given consideration. This chapter will begin with a consideration of the research in the long-term stability of selected behaviors and will continue with a discussion of the influence of parents and peers on the behavior of the child and the adolescent.

Stability of Behavior

Although major longitudinal studies on developmental stabilities in personality have been in progress for more than 25 years, findings have only recently begun to appear. A book by Stone and Onqué (1959) contained an annotated bibliography of longitudinal studies. Tuddenham (1959) reported on investigations at the University of California's Institute of Human Development which assessed the stability of selected behaviors from adolescence to adulthood. Irritability and ease of anger arousal in adolescents, assessed by observations and interviews, predicted interview ratings of similar response tendencies for men but not for women. Social anxiety, on the other hand, was stable from adolescence to adulthood in women but not in men.

A second longitudinal study of stability, by Kagan and Moss (1960), involved 71 subjects of the Fels Research Institute who were observed as children (from birth to age 14) and interviewed and tested as adults. Ratings of childhood behavior were then correlated with independent ratings of adult behavior for selected personality dimensions. Girls who were highly dependent on their mothers during ages 6 through 10 were highly dependent on their families and husbands as adults. Dependent behavior was not stable for males. The authors suggested that dependent behavior violated sex-role standards for males and that dependent boys learned to inhibit this behavior as they matured. A dependent posture was more congruent with traditional female sex-role standards, and the dependent girl was not highly pressured into inhibiting this response.

A short-term study of personality development during the first five years, reported by Thomas and others (1960) and Chess and others (1960), suggested that passivity in the preschool child may have its historical roots in behavior displayed during the first year of life. One hundred and ten children were studied continually from birth through age 5, primarily through interviews with the mothers at three-month intervals during the first year and semiannually thereafter. The authors postulated nine primary reaction patterns in the infant (including motor activity, passivity, perceptual thresholds, and rhythm in sleeping and feeding cycles) and concluded that the child's behavior at age 2 was derived, in part, from infantile reaction tendencies, with passivity a critical characteristic during the first year. Unfortunately, there was no detailed presentation of the statistical relationships between each of the infant behavior categories and aspects of the older child's behavior.

Escalona and Heider (1959) attempted to predict the behavior of 31 preschool children (aged 3 through 6 years) from observations made during the first eight months of life and from some knowledge of their parents. The predictions were most accurate for (a) degree of adoption of traditionally sex-typed traits, (b) motor development and co-ordination, and (c) capacity for attention and concentration. Predictive accuracy was poorest for (a) behavior in unfamiliar situations or with unfamiliar people, (b) competitiveness, and (c) quality of relationship with the mother. Unfortunately, the significance of these results is equivocal, since the accuracy of the predictions of preschool behavior from infancy behavior was evaluated by the person who made the original predictions.

Mussen (1961) suggested that the degree of adoption of traditional masculine or feminine sex-role interests among adolescent boys was stable over a 15-year period and had interesting derivatives in adulthood. Approximately twenty 17-year-old boys were identified at each extreme of a group of 68 arranged in order of their masculinity-femininity scores on the *Strong Vocational Interest Blank*. Administered the *California Psychological Inventory* in their early thirties, subjects with highest feminine-interest scores as adolescents were found to score higher as men on scales purporting to measure (a) nonmasculine interests, (b) dominance, and (c) capacity for status.

In an investigation of the stability of maternal behavior by Schaefer and Bayley (1960), a mother's behavior during the first three years of the child's life was related to her attitude during the child's adolescence. The early data were based on observations of mothers and children during testing sessions; the follow-up data were based on interviews with the mothers when the children were between 9 and 14 years of age. Love-hostility ratings were moderately stable over this period, whereas autonomy-control ratings did not show continuity. It was unfortunate that the authors pooled the data for the sexes, since these dimensions may have been differentially stable for boys and girls.

The last three years witnessed a dramatic increase in studies on the long-term stability of behavior. The data, though often meager and unsystematically collected, suggested that measures of selected behaviors of school-age and adolescent children often were predictive of adult functioning, especially when the behavior in question was congruent with traditional sex roles.

Additional References: Bronson, Katten, and Livson (1959); Durrett (1959); Kagan and Moss (1959b); Rheingold and Bayley (1959).

Family Influences on Personality Development

The delineation of two primary dimensions of maternal behavior—love *versus* hostility and autonomy *versus* control—was one of the important advances in research in parent-child relations. Schaefer (1959), analyzing ratings of maternal behavior from a variety of sources with the Guttman circumplex scheme, found these two independent dimensions emerged consistently from his analyses. Schaefer's conclusions were supported by the analyses of Becker (1960) and Milton (1958). The implication was that either these two dimensions are, indeed, the primary variables in the mother-child relationship or psychologists have great difficulty seeing or conceptualizing other aspects of maternal behavior. An excellent summary of methodological issues and findings in the study of parent-child relations appears in a chapter by Hoffman and Lippitt (1960).

Correlates of Love-Hostility and Autonomy-Control

Research in which parental practices and attitudes were correlated with the child's behavior included that of Burchinal (1958), who administered the *Porter Parental Acceptance Scale* to the mothers and fathers of 256 fifth-graders. The mothers made higher acceptance scores than the fathers, but there was no evidence of differential treatment of boys and girls. In other studies, by Emmerich (1959a, b) and Kagan and Lemkin (1960), controlled questioning of children revealed that both boys and girls perceived the mother as more nurturant than the father.

Trapp and Kausler (1958) investigated the relationship between parental dominance (as measured by a questionnaire) and the quality of the child's interaction with adults in a nursery-school situation. The children of parents scoring very high or very low on the dominance scale showed greater avoidance of adults in the nursery school than did the children of parents who scored in the intermediate range.

Peck (1958), studying 34 adolescents, correlated four dimensions of family interaction—consistency, democracy, trust and approval, and severity—with six trait clusters—ego strength, superego strength, willing social conformity, spontaneity, friendliness, and hostility-guilt complex. Those adolescents with high ego strength (i.e., mature, rational, possessing insight

into others' motives, and inner-directed) had parents who were consistent, trusting, and approval giving. Adolescents who felt guilty because of hostile feelings came from autocratic families.

In related studies, Antonovsky (1959) associated maternal restrictiveness with aggressive behavior in the child. Fathers with strict and punitive attitudes tended to have children who were aggressive (Marshall, 1961) or had behavior problems (Peterson and others, 1961). In the latter study, paternal attitudes were found to be more predictive of maladaptive behavior in children than were maternal attitudes. Becker and others (1959) interviewed parents of normal and disturbed children and found that arbitrary and authoritarian maternal attitudes were correlated with the presence of conduct problems in the children. The presence of excessive shyness and timidity in the child was associated with paternal maladjustment and frustration of the child's autonomy.

In a more comprehensive investigation, Sears, Maccoby, and Levin (1957) interviewed 379 mothers of five-year-old children in the Boston area. The mothers were questioned about their feelings toward motherhood, their child-rearing practices, and their children's behavior. The interviews focused on the developmental areas of feeding, toilet training, dependency, sex, aggression, and conscience development. The specific findings of this project were too numerous to summarize in detail. The data clearly indicated the importance of maternal warmth and affection. Lack of maternal warmth was associated with feeding problems and difficulty in toilet training. Moreover, the course of socialization training was highly dependent on the bond of affection between mother and child, for specific socialization practices had different effects depending on the strength of this bond. Finally, maternal punishment of undesirable behavior did not appear to be an effective method of eliminating the behavior, and severe physical punishment was associated with aggression toward the parents and retarded super-ego development.

Results from a study by the Fels Research Institute support the latter conclusion. Crandall and others (1958) measured social compliance among a group of nursery-school and early school-age children in a free-play situation and in the home. Ratings of the mothers on their reward of a child's compliance and their punishment of noncompliance were based on interviews and observations. Maternal reward of compliance was a much better predictor of the child's compliance outside the home than was punishment of noncompliant behavior. Thus, the finding by Sears, Maccoby, and Levin (1957) that punishment was not always an effective way of eliminating undesirable behavior was supported by evidence from this independent population.

Social Class, Parental Practices, and the Child's Behavior

Severe control, or, as Hoffman (1960) termed it, unqualified power assertion, was studied in 12 middle-class and 10 working-class families with

preschool children. Lengthy interviews with the parents yielded measures of power assertion which in turn were correlated with the child's behavior as observed in a group situation. The working-class parents were generally more power assertive than the middle-class parents, and the mothers who reacted to the children's disobedience with power assertion had children who tended to be hostile and dominant with peers.

The suggestion of an inverse correlation between socioeconomic class and intensity of punitive and dominant parental practices was supported in part by the work of Bayley and Schaefer (1960). Ratings of maternal behavior toward children during their first three years (based on observations) and again at age 10 (based on interviews) were correlated with social class. There was a positive relation between maternal warmth and socioeconomic class and a negative relation between dominance and control and socioeconomic class, with the suggestion of a closer relation between socioeconomic class and maternal behavior toward children during the first three years of life.

Miller and Swanson (1958) interviewed more than 500 mothers of children ranging in age from infancy to 19 years. The families were categorized according to socioeconomic class and rated on a new bureaucratic-entrepreneurial employment dimension (bureaucratic—father employed in a large organization *versus* entrepreneurial—father self-employed or employed in a small organization). The bureaucratic families, which tended to have more formal education than the entrepreneurial ones, were less concerned with teaching self-control to the child, and bureaucratic mothers were more permissive than entrepreneurial mothers.

Socioeconomic-class variables were also implicated in a study by Ferreira (1960) of antecedent correlates of neonatal behavior. Two scales, one assessing fear of harming the baby and the other assessing rejection of pregnancy, were administered to mothers in the last month of pregnancy. The infants were subsequently assessed for deviant behavior with respect to sleep, crying, and irritability during the first five days of life. More of the deviant babies than of the other babies had mothers who scored high on fear of harming the baby. However, the mothers with these high scores had less education than the mothers with low scores. Thus, the neonate's deviant behavior may well have been a function of socioeconomic-class variables not assessed by the investigator.

In summary, there appeared to be a relation between the child's behavior and the maternal love-hostility or autonomy-control dimensions. However, these maternal attitudes were, in turn, associated with socioeconomic-class membership. This makes interpretation of the former correlation difficult, since it is always possible that other variables, related to socioeconomic class but not assessed by the investigator, were the critical antecedent factors.

Additional References: Burchinal (1958); Clifford (1959); Durrett (1959); Gardner, Hawkes, and Burchinal (1961); Garner and Wenar (1959); Gordon (1959); Hoffman (1961); Kagan and Moss (1959a);

and Schmidt (1958) asked 2400 adolescents of high-income, middle-income, and low-income families to describe the traits that led to acceptance or rejection. All children regarded intelligence, fairness, honesty, and conscientiousness as positive, and noisiness and conceit as negative. Aggression was a frequent basis for rejection among the low-income and middle-income groups, but seemed irrelevant for the children of upper-income families. Goertzen (1959) administered a 32-item opinion scale to 1773 boys and girls in the seventh grade, taking into account the variables of sex, birth order, intelligence, and socioeconomic class. None of these variables was related to the children's answers, and all the children agreed that aggressive behavior was more objectionable than nonconforming or withdrawing behavior.

Marshall (1961) assessed the behavior of nursery-school children both in a role-playing situation and in a realistic context. Frequency of hostile behavior in the role play, but not in the realistic situation, was related to social acceptance for boys but not for girls. Thus, aggressive behavior was socially more acceptable when placed in a context appropriate for the rehearsal of sex-typed behaviors.

Peer Status and Interpersonal Behavior

Zander and Van Egmond (1958) explored the ways in which the popular and high-status (i.e., socially powerful) child interacted with his peers in a problem situation. The authors selected children from the second and fifth grades, who fell into four groups: high-intelligence-high-status, high-intelligence-low-status, low-intelligence-high-status, low-intelligence-low-status. Groups were established in which these preselected subjects interacted with classmates in a problem situation (e.g., guessing the number of beans in a bottle). The boys who were low in both intelligence and status measures were passive in the problem-solving situation. There were no significant behavioral differences among the boys in the other three intelligence-status combinations. Among the girls, low social power was predictive of passivity in the problem situation regardless of level of intelligence.

In a related study, Harvey and Rutherford (1960) measured status and popularity among 405 children in grades 3, 6, 9, and 11 with sociometric devices. In a classroom setting, the children first indicated their preference for one of two similar pictures. Later, the children read a booklet giving the preferences of a high-status and a low-status child and were instructed to indicate again their preferences for one of the two pictures. The results indicated the following: (a) among the children in grades 6 and 11, there was a greater shift in preference toward the picture preferred by the high-status child than in grades 3 and 9; (b) girls were influenced more than boys; (c) children of low status were influenced more than those of high status.

Situational Variables in Peer Interaction

The influence of the situation on group behavior was illustrated in a set of reports on six hyperaggressive boys (Dittmann and Goodrich, 1961; Raush, Dittmann, and Taylor, 1959a, b; Raush, Farbman, and Llewellyn, 1960). The boys were observed in six different settings on two behavioral dimensions (friendly-hostile and dominant-submissive) on two occasions 18 months apart. The major findings were as follows: (a) low frequency of hostile behaviors in eating situations, (b) higher frequency of hostile behaviors in a structured game situation than in free-play settings, and (c) less hostile behavior toward adults during the second set of observations than during the first.

The investigations of peer-group influences discussed above point to the potentially important role of social power or popularity in the course of a child's development of an autonomous or a passive disposition with others. It becomes important, therefore, to discover each of the many factors that facilitate or obstruct peer acceptance. There is reason to believe that physique, membership in ethnic or racial minority groups, and exercise of peer-disapproved behaviors are all relevant variables.

Additional References: Handlon and Gross (1959); Horowitz (1961); Koch (1960); Meyer (1959).

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CHAPTER III

Personality and Social Development: Societal Influences

IRVING TORGOFF *

THE EFFECT on personality development of the radical social changes characteristic of contemporary life was a matter of much concern (Stein, Vidich, and White, 1960) and conjecture but of surprisingly rare empirical effort.

Ecological Variables

Barker (1960) made a theoretical analysis of the effect of the ecological environment on the individual and presented empirical findings. In a study of residents of two communities, he predicted a number of behavioral and underlying personality differences as a function of the difference in the proportion of those actually participating and those who potentially could be involved in various behavioral settings (school, church, factory). The application of ecological concepts to the study of personality development in the underdeveloped nations now undergoing radical social and economic upheaval remains a task for the future.

Gump and Kounin (1960), in a number of ecological research studies in home, camp, and classroom settings, demonstrated the relationship between differences in the milieu stream and the behavior stream of the individual. Another type of ecological approach was illustrated in an earlier study by Kounin and Gump (1958) of the ripple effect on the children constituting the audience when a teacher disciplined a target child. The significance of the ripple effect in wider social settings was not explored. In a nationwide study, Lazarsfeld and Thielens (1958) explored the effects of the tensions engendered during World War II by the emphasis on "loyalty" and "national security." Through interviews, they explored the reactions and professional activities of a representative sample of 2451 social scientists and revealed the presence of a powerful ripple effect. Teachers' apprehensiveness increased in proportion to the number of incidents involving colleagues, regardless of ideological position and despite the fact that the interviewers had not personally experienced difficulties.

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School

Analyzing the elementary-school and secondary-school class as a social system, Parsons (1959) outlined the relation of its structure to its primary societal functions as an agency of (a) socialization and (b) manpower allocation. Sexton (1961) presented striking empirical confirmation of the social-class implications of the sorting function of schools. Brim (1958) emphasized the value of the classroom as a research setting for the study of the genesis of deviancy and the effects of various types of social control. The findings and implications of a set of theoretically interwoven studies on the handling of deviancy in classrooms, utilizing the ripple effect paradigm, were described by Kounin, Gump, and Ryan (1961).

Teacher Characteristics

Ryans (1961) reported that observers related pupil *participation* in elementary-school classrooms to flexible, original, democratic teacher behavior, whereas *controlled* pupil behavior was related to systematic, responsible teacher behavior. The differential efficacy of various types of experimentally manipulated influencing techniques used by USAF instructors was reported by Torrance and Mason (1958). Studying instructor method on acceptance of food in a survival kit, the method of grading the men on their participation was found consistently superior to other direct and indirect influence methods. Reed (1961) found that both "warmth" on the part of science teachers and their utilization of pupils' intrinsic motivation, as rated by these pupils, were positively related to their pupils' interest in ninth-grade science. The level of demands made by the teacher in this situation was not a significant variable. From a combination of selected test scores on the *Edwards Personal Preference Schedule* obtained months earlier, Medley (1961) successfully predicted the ability of education students to establish teacher-pupil rapport. An emotionally intense type of teacher-pupil interaction—transference and counter-transference—was analyzed psychoanalytically by Baron (1960).

Classroom and School Characteristics

Lippitt and Gold (1959) found a correlation between various types of classroom socioemotional structures (stratification of those who are looked up to or down on in various ways) and mental health. Coleman's (1961) study was focused on the causes and consequences of the different varieties of adolescent status systems denoting the social climates found in different schools. The author proposed that efforts be made to redirect the whole adolescent culture so that it motivates the child toward goals congruent with those of adult society. Operating from a theoretical base provided by Pavlov and Makeyenko, Soviet researchers explored the effect of classroom and extraclassroom *milieux* on motivational, cognitive, and be-

havioral aspects of personality development (Bronfenbrenner, 1961a; Riabkova, 1960; Zhavoronko, 1960).

Wilson (1959) examined the aspirations of boys with similar social origins who were attending schools characterized by different climates of aspiration. He found that, among sons of both professional workers and manual workers, more of those attending middle-class schools than of those attending working-class schools wanted to go to college. Wilson ascribed these aspirations to the influence of "the dominant class character of the high school's student body" and to peer-group norms. Sexton (1961), however, showed that schools in districts different in socioeconomic class differed not only in composition of student body but also in plant and in educational and personnel facilities. Both Wilson and Sexton emphasized the waste of talent resulting from *de facto* segregation by socioeconomic class. The importance of perceived faculty characteristics relative to peer-group norms was reported by Thistlethwaite (1960) in a study of factors affecting the educational aspirations of scholarship award winners.

Mass Media

Two books were published on the effects of television on children. Both were of the mass questionnaire, survey type, supplemented by other measuring instruments. Himmelweit, Oppenheim, and Vince (1958), after studying a sampling from 2000 English children, found that television viewing subtly but consistently influenced the children's outlook on the world and their value judgments; there was no evidence of any consistent effect on aggression or passivity. Fear reactions were related to the extent to which violence was portrayed in realistic and personal rather than stylized fashion. They found that the nature of the child himself was important in determining the impact of television.

Schramm, Lyle, and Parker (1961) also stressed the importance of conceptualizing the impact of television as due to interaction between the characteristics of both television and child in a social setting. They noted that the crucial, irreducible television variable necessary to understand and predict the effects of this interaction was the fantasy-reality dimension. Child characteristics found to affect the interaction significantly were mental ability, internalization of social norms, gratification derived from social relationships with peers and parents, age, and sex. Relationships were found to be complex and dependent upon "a *kind* of television and a *kind* of child in a *kind* of situation."

Bailyn (1959) reported that frequent exposure to pictorial mass media (television, movies, and comic books) resulted in a tendency among boys to classify people in a stereotyped way and to show a more passive and acceptant attitude. This effect was greater among boys with many problems. On the basis of the belief that mass media viewers prefer themes similar to their own basic problems, Emery (1959) hypothesized and found that preadolescent boys interpreted a Western film in terms of a

latent dyadic theme (*superego versus id*; *good versus evil*) rather than an oedipal theme (young male competing with older male for female). Lack of control groups, however, limited the interpretation of the findings. Lövaas (1961) examined the effects of a film apart from the child's personality characteristics and found that exposure to a film containing aggressive content resulted in an *increase* in the aggressive drive of children (measured by bar-pressing responses producing aggressive doll action). Bauer and Bauer (1960) critically evaluated research evidence on the alleged effects of mass media.

Social Class and Ethnic Background

Wide attention was given both to the process by which social class and ethnic background affected achievement motivation and to the role of parents as mediating agents. Strodbeck (1958) reported on ethnic differences in status mobility as a function of differences in achievement values, beliefs, child-training practices, and family power structure. Values placed on achievement reflected the differential achievement of (a) the two ethnic groups (the difference was attenuated, however, when class level was held constant), (b) the fathers, as indirectly manifested in social-class status, and (c) the sons, as directly manifested in overachievement and underachievement in school. In a psychodynamically oriented study Adelson (1958) found different types of motivational patterns underlying mobility strivings.

Pierce-Jones (1959) reported that adolescents with backgrounds of high socioeconomic status were less interested in outdoor and mechanical activities and more strongly attracted to intellectual pursuits than were their lower-status age-mates. An experimental study by Hoffman, Mitsos, and Protz (1958) revealed that material rewards increased the achievement strivings of working-class high-school students to a greater degree than they did those of middle-class students. Reward-induced strivings in tasks evaluating their "ability to think" touched off, in some middle-class students, anxiety responses that lowered the level of their performance. Apparently, middle-class adolescents are attracted to intellectual pursuits; but, as in the case of the moth and the flame, the pursuit may lead to an anxiety-laden singeing. Sarason and others (1960), however, found no appreciable relationship between social-class membership and the degree of test anxiety shown by elementary-school children.

Miller and Swanson (1960), in a theoretical analysis of the impact of social structure on personality, attempted to reconcile psychoanalytic doctrine with sociological concepts. Methods of resolving conflict, moral standards, and styles of expression were viewed as products of experiences in different types of social structures. Social structure, in turn, was conceptualized on the basis of the degree to which the structure encouraged the interdependence of its members, differentiated into entrepreneurial and

bureaucratic settings. Rodman (1959) analyzed the problem faced by the middle-class social scientist or practitioner in understanding working-class behavior.

Parent-Child Relations

The influence of social class on parental values and behavior received both speculative and empirical attention. Bronfenbrenner (1958) analyzed studies of class differences in child rearing over a 25-year period and noted a shift in the direction of middle-class values and behaviors. Bronfenbrenner's ascription of causal significance to the parallel shifts of expert opinion and parental behavior was questioned by Cohen (1961).

Miller and Swanson (1958) viewed recent changes in American child-rearing practices as a function of the shift from an entrepreneurial to a bureaucratic social structure. Their major thesis was that the bureaucratic-entrepreneurial dichotomy, cutting across social-class lines, carried with it characteristic patterns of family structure, values, and outlook on life, as well as characteristic ideas of the means and ends of socialization. A direct study of the effect of these setting-differentiated practices on the child's personality awaits further investigation. A bureaucratic-entrepreneurial analysis can be applied to Danziger's (1960) study of Javanese child-rearing practices. Gold and Slater (1958) found the bureaucratic-entrepreneurial dichotomy to be of heuristic value in distinguishing the power structure and ideology of the husband-wife relationship.

Hoffman (1960) reported on some of the data obtained in a study of the antecedents and consequences of parental influence techniques. Hoffman found that working-class fathers used more power assertions than did middle-class fathers. The lack of class differences between influence techniques of mothers was ascribed to the greater susceptibility to expert opinion by working-class mothers as compared with their husbands. Kohn (1959b) found no class differences in the use of physical punishment, but did find class differences in the conditions calling forth such punishment: working-class parents responded to the immediate consequences of the child's act, whereas middle-class parents responded to the underlying motivation of the act. Torgoff (1961) reported that middle-class children's compliance with their parents' influence techniques was positively related to the greater emphasis parents placed on the achievement-inducing (relative to the independence-granting) component of the parental role; negative but nonsignificant relationships were apparent in a working-class setting. In an earlier paper, Torgoff (1958) described the questionnaire used in the measurement of the two parental role components and reported that middle-class parents, compared with working-class parents, were oriented toward earlier emphasis on both the achievement-inducing and the independence-granting components.

Rosen and D'Andrade (1959) conducted an ingenious field experiment using observations of family interactions around standardized problem-

Role

Brown (1958) presented an analysis of social and developmental forces operative in the converging preferences of both sexes for the masculine role. Findings from a play preference check list for the measurement of masculinity and femininity in children led Rosenberg and Sutton-Smith (1960) to characterize the change in sex roles, not as role convergence, but rather as an extension of female role perception (possibly similar to Rodman's "lower-class value stretch") and a contraction of male role perception. The extent of the effect of sex-role identification was strikingly demonstrated in an experimental study by Milton (1959), who found a positive relationship between masculine sex-role identification and problem-solving skill both across sexes and within a given sex.

Some of the implications of current changes in sex-role patterns were outlined by Hartley (1960). The question of whether the more rigidly defined sex-role differentiation found in lower socioeconomic groups was due to their higher degree of authoritarianism was explored by Johnson, Johnson, and Martin (1961). They found sex-role differentiation unrelated to parents' occupation when classified by socioeconomic class, but did find differentiation when occupation was classified according to the entrepreneurial-bureaucratic dimension. Maccoby (1959) presented a theoretical analysis of the development of role-taking behavior in childhood.

Cultures in Transition

Ausubel (1960) reported on a field study of the effect of acculturative stress, brought about by Westernization, on Maori adolescents. He attributed the ultimate source of Maori-European differences in adolescent development to the Maoris' greater emphasis on task- and group-oriented aspects of attained status as the basis of self-esteem and their lesser emphasis on self-aggrandizing aspects. This emphasis on task- and group-oriented aspects of attained status can also be seen in the family structure and child-rearing practices of rural Javanese (Danziger, 1960). Danziger concluded that social progress would have to be based on an appeal to sources of motivation other than those of individual success and self-aggrandizement. Bronfenbrenner (1961a) described Soviet attempts to create a "new Soviet man," emphasizing the development of a motivational system based on social, rather than individual, rewards and controls. The results of such a total-culture push are difficult to assess; the balance and pattern of consequences raises an even more complex problem of evaluation. Two reports—one, an impressionistic account of a visit (Alt, 1958); the other, an analysis of data obtained from refugees from the Soviet Union (Inkeles and Bauer, 1959)—provided only the most preliminary data on which to assess the impact of Soviet life on the personality of its citizens. The impact of communal life in an Israeli *kibbutz* on personality

development was described by Spiro and Spiro (1958). Yang (1959) analyzed changes that the Chinese Communist revolution made in the structure and function of the family. Hoffman and Wyatt (1960) presented a theoretical analysis of changes in American family size as a function of changes in motivation for reproduction brought about by social changes.

Puerto Rico, undergoing island-wide transformation, was the locale for a number of studies on social change. Back (1958), after studying slum dwellers in different stages of relocation, concluded that disposition for change is a general personality trait. Green (1960) compared Puerto Rican (Spanish) and Jamaican (English) child-rearing practices and personality characteristics and related these to differences in the cultural traditions characteristic of the two islands.

Landy (1959) conducted an intensive anthropological field study of family patterns and child-rearing practices in a Puerto Rican village and compared these to the child-rearing practices Maccoby and Gibbs found in a New England community. Landy concluded that "changes in Puerto Rico will succeed to the extent that they are consonant with the practices, values and needs of the parents and children." The importance ascribed to the role of the family and the pattern of socialization in the stability of cultural change was questioned by others. Manners (1960) suggested that "changes in Puerto Rico—as elsewhere—will come about whether or not these appear consonant with existing practices, values and needs of parents and children." According to Manners, peoples of underdeveloped areas are eager to abandon old interpersonal patterns for new "if the exchange brings with it the measurable advances of a 'higher standard of living.'"

Conclusion

Much of the research reviewed would have benefited from the use of previously obtained base lines by which to assess change. The need for systematic, periodic, extensive assessments of social and personality characteristics cannot be ignored if we are ever to understand the impact of contemporary and future social changes on personality development.

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CHAPTER IV

Aging and Psychological Adjustment: Problem Solving and Motivation

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THE PSYCHOLOGY of aging, the developmental psychology of the adult years, recently made a considerable advance in organization of information. As in the field of child psychology, a comprehensive handbook of the psychology of the adult years became available, *Handbook of Aging and the Individual*, edited by Birren (1959). Its primary objective was to integrate information and explain the manifest changes which occur in the aging individual. In 24 chapters, this collaborative volume reviewed such aspects of the aging individual as sensation and perception, emotions, learning, intelligence, interests and attitudes, and personality and adjustment. A related volume, *Handbook of Social Gerontology*, edited by Tibbitts (1960), took a sociological point of view toward aging, in recognition of the changing nature of a group or society as a function of the age distribution of its members.

Quite different in purpose and scope was a significant volume edited by Kleemeier (1961) on research in the use of leisure. The years both before and after retirement were described and analyzed with insight, and the book held useful and interesting implications on the potential late-life consequences of education. It emphasized a long-range approach to the use of leisure time, either for mental activity or as an expressive outlet. The trend toward intellectual and expressive sophistication in free-time activity will undoubtedly involve more adult education as well as more attention on the part of educators to what happens to the young people they educate. In view of immediate problems in the education of the developing child, it is not easy to keep in mind that the fundamental criteria for judging developmental influences are the long-term outcomes in the adult. Further, the average person in America spends about 12 or 13 years as a student, or less than 20 percent of the average life span. If age 20 is taken as the end of growth, less than one-third of the life span is spent in growing up. Emphasis on the long-term outcomes of education and development is needed, therefore, if only because of the relatively long period of adult life. Teleologically, it might be said that the goal of growth and developmental processes is achievement of the full capacities of the adult state and maintenance of this state as long as possible. But there were few studies relating to characteristics of early and later life. Further, in such studies as there were, the effects of selection in survival pervaded studies of old age. How most people grow old is still a difficult question to answer.

A significant change in the attitudes of society was shown by the dropping of resistance to research on aging and by movement toward a phase of active encouragement. The White House Conference on Aging of February 1961 included three research groups in addition to other groups devoted to particular problems of late life. The conference as a whole indicated confidence that research in aging would benefit society and individuals. This attitude represents a considerable change from the days of Quetelet in the nineteenth century when, according to Birren (1961), the study of aging was regarded as an undesirable, fatalistic preoccupation.

Birren (1960b) reported a considerable increase in research on aging during the past decade. More reports of research on the psychology of aging were published between 1950 and 1959 than in the entire previous history of the field. Further, a prediction was made that the total literature would at least double in the sixties (Birren, 1961). Such a rate of publication would result in a specialization of interests not unlike that in child psychology and would require new library methods to facilitate storage and retrieval of information.

Psychobiology of Aging

As in child development, there was increased interest in higher cognitive processes in the aging adult. Psychological changes of aging continued to be studied with an eye on the concomitant changes in the rest of the organism, particularly the nervous system. A symposium on research on the process of aging in the nervous system, edited by Birren, Imus, and Windle (1959), indicated a considerable gap in knowledge between the gross and microscopic anatomical changes, on the one hand, and behavioral changes, on the other. Because of this gap, caution prevented statements about behavioral consequences of pathological or physiological changes associated with age, although a symposium edited by Shock (1960) described much activity in relating these two fields.

Biologists with mathematical orientation were prone to take probabilistic views of aging or of survival of aggregates of cells or organisms, as in the work reported by Strehler and others (1960), Szilard (1959), and Wolstenholme and O'Connor (1960). Szilard (1959) and others viewed aging largely as a nonspecific process. Unlike development, which they saw as an orderly process, aging in their view is a process of disorganization along many paths for both individuals and species. An opposing view was that aging follows an internal pattern characteristic of a species. A major problem arising from this view was accounting for the evolution of purported control over late-life functions, since it was not immediately clear how selection of postreproductive characteristics could occur. Birren (1960a) suggested, however, that, if aging is closely related to development, then patterns of growth selected in evolution may determine the patterns of aging. While biologists often com-

mented that processes of growth and aging are antagonistic, there was little evidence about the nature or mechanisms of the antagonism.

In contrast with students of physical-biological aspects of aging, psychologists were interested in the survival and life processes of individuals rather than in mere survival totals. Thus, there tended to be a hiatus in thinking and a difference in purpose between those who studied individual differences and those who did not. Difficulties in research stemmed from the fact that many naturally occurring individual differences in human characteristics may not be experimentally manipulated; important aspects of adult life will have to be observed in their natural environmental settings.

As improvements in the physical and social environments of technically advanced countries continued, new or emerging biological and psychological aspects of aging could be seen. According to Hardin B. Jones (1959), in technically advanced countries where longevity increased, women gained more in life expectancy than did men. Thus, in advanced countries widowhood was a major social problem; in less advanced countries orphanhood was a major concern. With more uniform improvement of living conditions in society, it seemed that individual biological factors such as heredity would acquire greater practical significance. Hence, aging had to be regarded as a basic problem requiring an evolutionary approach in its social, as well as its biological, aspects, for as early manifestations of aging became understood and controlled, new manifestations would emerge.

The Individual Organism

Although many biologists (Strehler and others, 1960; and Szilard, 1959) tended to regard aging as a process of random dissolution, they did not deny that as the individual ages there are changes in his thinking, his performance, his feelings in relation to himself and his world, and his behavior in relation to others (Birren, 1959). It was the organization of the age changes which was of theoretical concern. While not all of these changes were seen as related, researchers implied (Shock, 1960) that aging of the individual is to some extent an integrated phenomenon and should be regarded as a joint product of physiological, psychological, and social changes.

The term *adjustment*, used to refer to the final behavioral output of the individual, remained an elusive concept despite its initial attractiveness. The concept of the whole individual was as vague for the adult years as for childhood, and although investigators made obeisance toward the value of studying the adjustment of the whole individual, in practice their research concerned isolated aspects of subsystems of the organism. Gerard (1959), however, suggested that certain phenomena, including aging, appear only at or above a certain level of complexity of organization. He examined the behavioral output of the individual at the top of a

hierarchical organization in which many subsystems provide the necessary conditions for the final output, but do not directly determine its complexity. In Gerard's view, much of the biology of the individual was held to be maintenance biology, necessary but without direct behavioral consequence, and many of the catalogued biological changes of age were without direct behavioral significance. Biological and behavioral flexibility implied a considerable range of autonomy of function, typical of the optimum state of the adaptive adult organism. Capacity for complex behavior could be regarded as one important aspect of a comprehensive view of adult adjustment.

Automation and Aging

Several trends combined to emphasize higher thought processes in the adult, among them contemporary encouragement of training for scientific output and changes in methods of industrial production. Industry was moving rapidly from dependence on handicrafts and psychomotor skills to programmed control of machine production. According to Crossman (1960) and Welford (1960), skills requiring dexterity, speed, strength, and endurance were increasingly being taken over by the machine, leaving the manager with a more specialized intellectual role and the worker with a vigilance task. The employee of a highly automated industry apparently controlled output by monitoring a large system and making judgments and adjustments to secure high output at good quality. This required effective communication with other members of the operating group. Welford (1960, p. 59) summarized his analysis of the trends in this way: "Although automatic methods may reduce the immediate part played by human operator, they leave human beings in certain key positions in which the mental load upon them may be heavy and the effects of their actions far-reaching. The human link in the system thus becomes more and not less important than it was before."

Such trends in industry emphasized the need for characteristics usually associated with college or university training. Whether large numbers of individuals could be effectively taught logical analysis, problem solving, and long-term planning and control, divorced from any realistic application as in an industrial situation, remained to be seen. Transfer of training was no new problem for educators, but contemporary trends made it more acute by stress on logical problem solving.

Problem Solving in the Aged

In the tradition of its Greco-Roman ancestry, our culture has nurtured two apparently opposing stereotypes of the aged individual. Richardson (1933) described one type as mentally regressed, perhaps below the level of prepubescent youth, and the other as informed, sagacious, and resource-

ful. These types were not necessarily mutually exclusive: both types could exist within the wide range of individual differences suggested by senile, mentally ill persons at one extreme and intellectually vigorous octogenarians like Bertrand Russell, Winston Churchill, and Herbert Hoover at the other. It was important, however, to determine whether these contrasting characterizations represented the extremes of a continuous dispersion of mental proficiencies or clusters in a bimodal or multimodal distribution. The possibility of bimodality merited explicit consideration because incidental observations implying bimodality had frequently been reported, whereas the rival hypothesis of continuity, though often assumed in statistical tests, had not been adequately confirmed. The failure to evaluate these mutually exclusive possibilities probably reflected the fact that gerontological psychology had not been conspicuously hypothesis directed.

Research on aging appeared, in fact, to be predominantly concerned with vigorously prosecuting a multifaceted search for apparently age-related behavioral defects. In the area of thinking, these were sought almost exclusively through analysis of performance on standardized tests of mental ability, reviewed by Harold E. Jones (1959). Although unconfirmed instances of dissidence occasionally occurred, the results of these investigations displayed an uncommon amount of interstudy agreement: the aged were repeatedly found to perform as well as young subjects on subtests of vocabulary and elementary arithmetic and were repeatedly deficient in their performances on subtests presumably requiring reasoning ability (analogies, block arrangements, and so on). The degree of conviction that would normally accrue from such consensus was seriously weakened, however, by the perplexing ambiguities that attached to the cross-sectional design. Moreover, later developments in this area brought little, if any, improvement.

Norman and Daley (1959), using a selected group of superior older women, confirmed the general findings outlined above. Over an eight-year test-retest interval, in a longitudinal study of 36 pairs of twins, Falek and others (1960) found a statistically unreliable decline in scores on all of six tests including digit-symbol, block design, similarities, and digit span from the *Wechsler-Bellevue Intelligence Scale*, Form I, from List 1 of the *Stanford-Binet Vocabulary Test*, and from a paper-and-pencil tapping test. Thus the results of recent mental testing were consistent with the accumulated findings of the past 40 years and indicated no need for re-evaluation in this area. However, more extensive longitudinal investigation of cognitive functions is still needed.

Since evidence of diminished ability of elderly persons to reason clearly had been provided by the results of mental testing, researchers were encouraged to undertake more detailed investigations seeking first-order explanations of this deficiency. Thus, in a design primarily intended to secure exemplars of logical construction from subjects of various ages, Welford (1958) reported a study by Allan that employed an unstandardized test consisting basically of a set of statements on topics of com-

mon current interest. The total set comprised two complementary subsets, one consisting of mutually compatible members, the other containing only statements that were inconsistent with at least one other member of the total set. The subjects were asked to construct answers to specific questions which required (a) identification of the members of the first subset as compatible statements and (b) derivation of a valid conclusion from this subset. When the replies were evaluated, it was found that a disproportionately large number of aged subjects produced answers inconsistent with the request for logical analysis and derivation; rather, they made comments on the premises and expressed opinions that were quite independent of those embodied in the test statements. They apparently felt free to reject or correct the premises if they believed them to be in error, and their conclusions seemed to be based on attitudes.

In a more elaborate and formal investigation, Friend and Zubek (1958) obtained results which confirmed and extended Allan's findings. The *Watson-Glaser Critical Thinking Appraisal* was administered to some 480 subjects aged 12 to 80. This battery consisted of subtests purporting to evaluate the following a priori components of goal-directed thinking: the ability to (a) draw valid inferences, (b) recognize assumptions, (c) draw deductions from brief syllogisms, (d) weigh evidence, and (e) evaluate arguments. Further differentiation of items into those that allegedly possessed emotional content and those that were allegedly neutral provided a basis for the development of indexes of objectivity and inflexibility of thought. The results were considered to indicate a marked difference between the older and younger subjects in the ability to think critically, and it was believed that this difference could be largely explained by the inflexibility and low objectivity of the older subjects' performances. Thus, by vastly different methods—one subjective, the other employing a larger number—these two investigations arrived at similar characterizations of logicalness in the performance of elderly people. It appeared that the aged tended to evade, when possible, the analysis of logical forms and the evaluation of arguments on the basis of their logical merits, and preferred to base their evaluation and conclusions on what they believed to be the truths involved.

These two studies were primarily product-oriented and reflected the subjects' mastery of the elements of logic.

The two experiments described below were principally process-oriented and reflected the subjects' proficiency in eliciting and integrating information relevant to a chosen objective. Welford (1958) described an experiment performed by Bernardelli in which contrasting age groups of subjects with no previous electrical knowledge were given instruction, including a demonstration problem, on how to identify the terminals of a resistance net. Four boxes, in which the terminals of the demonstration net were connected to external posts in various patterns, were employed as test materials. Given a wiring diagram of the net and an ohmmeter, the subjects' task was to discover how each of the six posts for each of

the four black boxes was associated with the several internal resistances. Elderly subjects correctly identified more terminals per problem, but the difference was not statistically significant. On the average, the older subjects made 37 percent more readings and used 85 percent more time. It was inferred that they had more difficulty in assigning meanings to their readings and more trouble with the short-term memory requirements of the task than did the young subjects.

Using a slightly modified version of John's (1957) device, Jerome (1960) tested two contrasting age groups, choosing a procedure appropriate for the work rate of the aged subjects. The test involved an electrically monitored, button-pressing, event-ordering set of problems that required, for their solution, the integration of sequentially elicited, discrete items of information transmitted on demand as signals from the apparatus. Problems were at four levels of difficulty, with two equivalent forms at each level. Each subject attempted the problems in ascending order of difficulty. If he failed to solve a problem, he was given the alternate form at the same level of difficulty. If he failed to solve this, he was terminated; if he succeeded, he was promoted to the next rank. This procedure was continued with each subject until he failed twice in one rank or passed at all four levels of difficulty. The achievements of the aged and of the young subjects differed sharply, with the least proficient of the young subjects slightly superior to the best of the aged. In all relevant indexes except the rate of inquiry, the young were superior by a factor greater than 2, and in some instances by a factor greater than 5. Perhaps more important than the differentiating power of this design, however, was its capacity to supply data as a basis for diagnosing the heuristic deficiencies that obstructed or precluded success. Causes indicated for the manifest ineptitude of the older subjects were as follows: (a) an inability or unwillingness to apply a strategy that was repeatedly demonstrated and that every young subject employed skillfully, (b) an apparent lack of appreciation of the value of identifying the specific goal condition of a problem early in the effort, (c) a disorderly search behavior, (d) a high degree of redundancy of inquiry, and (e) a disinclination to keep notes. It was inferred from these results that the patterns of heuristic control, so laboriously acquired during youth through formal education and emulation of skillful and successful associates, decay significantly with disuse and with age.

In summary, data from a large number of cross-sectional investigations encouraged the belief that the problem-solving abilities of mature persons differ widely with age, particularly in the United States. Although the few current longitudinal observations did not completely discredit the presumption that the difference in favor of youth resulted from an individual deterioration with age, they also failed to obtain the probative support logically required for the hypothesis of cognitive degeneration. On the other hand, the processes that were found defective in older subjects—applying simple solution strategies, identifying specific goals,

orderly inquiry, preservation of information—depended only on fundamental heuristic principles that had been taught to all generations in our culture. When, therefore, an allegedly normal group was found defective in their use, it was attractive to assume that these behavioral learnings had decayed, probably through disuse, rather than to presume that they had never been acquired.

Finally, a possibility that received conventional obeisance from all workers in the area was that suprasextogenarians did not invest in these artificial and—let it be acknowledged—mildly ludicrous tests as much ego involvement and effort as younger subjects did. Inferences derived from studies like those described above must be qualified in the light of the uncertain contributions of motivation.

Motivation

Botwinick (1959) and Kuhlen (1959) discussed motivation of different age groups, a fundamental problem that related to the broad range of psychological aspects of aging and that raised questions of stimulus equivalence and response equivalence. In most experiments the equivalence of subjects' motivation was taken for granted; yet if this differed with age, failure to control the variable, or at least to measure it, could result in a false interpretation of results. The crucial point for research on aging was whether motivational response varied as a function of age when people were placed in the same objective (but not necessarily the same subjective) situation. Recent research provided tentative answers to three pertinent questions: (a) Do people of different ages vary in social interests and needs and emotional reactions? (b) Do people of different ages vary in the amount of confidence and caution they display? (c) As age increases, is there any alteration in expectations, set, or attitude toward change?

Social Interests and Needs and Emotional Reactions

Social withdrawal with increasing age was found by Bendig (1960), who investigated changes in scores on the *Guilford-Zimmerman Temperament Survey* among four groups of 100 subjects each, in their twenties, thirties, forties, and fifties. Ascendancy and sociability (which are highly correlated) and masculinity declined with age, but restraint increased with age. A change somewhat later in life was found by Schaie (1959) in a study of 500 subjects aged 20 to 70. He included a short social responsibility scale as padding among the items of a personality inventory. The social responsibility scores increased with age to the mid-fifties and then decreased. Dean (1960) asked 280 subjects aged 49 to 89 to name the "best things" and "worst things" about their present lives. "Best things," classified as "activity in the outside world," "intake from the world," and "survival," showed the expected trend toward withdrawal

with age. "Worst things" in the younger groups were "threats to survival" and, among older subjects, "frustrated outside activities."

That emotional excitement also seemed to decrease with age was shown by Rosen and Neugarten (1960), who gave the *Thematic Apperception Test (TAT)* to 144 subjects aged 40 to 71. Older subjects introduced fewer extra characters into their test stories, used less conflict and less strong emotions, and described less vigorous activities. These results were shown to be due to age rather than to sex or social class, although it was possible that the content of the *TAT* pictures, particularly the apparent age of the figures portrayed, influenced the results. Similar findings, however, were obtained by Lakin and Eisdorfer (1960) in response to a Reitman stick-figure test. Twenty-four subjects of a mean age of 23.7 mentioned more emotions, a greater intensity of emotion, and more activity than 55 subjects with a mean age of 73.2. Contrary to expectation, the old named as few somatic responses as the young, although a comparison group of young patients did give more somatic responses. Lakin and Eisdorfer suggested that preoccupation with survival might have been the result of psychosocial and physical assaults rather than a concomitant of age itself. In related work, Veroff and others (1960) used *TAT* pictures to study three needs—affiliation, achievement, and power—in a nationwide sample of 590 men and 770 women aged 21 to over 65. As might have been expected, results showed decreases with increasing age in need for achievement among men and in need for affiliation and need for power among women, but need for power increased with age among men. An interesting comparison of married subjects over 50 with widows and widowers of similar age showed that the bereaved had lower need for achievement, lower need for affiliation, and, among women only, lower need for power. Although length of time since bereavement was not taken into account, this personal factor may have helped determine the needs expressed.

Is the apparent withdrawal with age "natural" or the result of stress? Cumming and others (1960), in their theory of disengagement, stated that, as a person ages, there is a reduction in the amount, variety, and intensity of social interaction, that the individual becomes more concerned with integrating his own thought and views on the world. They held that this reduction in outward activity is normal, with death as the logical end, and that older persons holding middle-aged standards would be ill-adjusted and probably of low morale. It seemed likely, however, from the work described above, that stress plays a part in disengagement.

Confidence and Caution

Caution among older people was examined by Wallach and Kogan (1961). Their subjects were 89 women and 65 men of a mean age of 70.3 and 132 women and 225 men college undergraduates. Vocabulary scores were higher for the old than for the young. In completing a ques-

tionnaire about the chances of occurrence of certain future events, older subjects made less extreme estimates than younger ones. Scores indicated that the subjects' confidence about their judgments decreased with age for both sexes, more markedly among men, while men among young subjects had higher confidence than women. The probability of success required before the subject would advocate a high-risk, high-reward course of action was found to increase with age. From these results Wallach and Kogan suggested that caution becomes more pronounced with age.

In another attempt to account for age differences in performance, Botwinick, Brinley, and Robbin (1958a, 1959a, b) studied auditory reaction time. They gave 30 subjects, median age 23, and 30 subjects, median age 71, a series of auditory stimuli with quasi-random preparatory intervals (PI's). Whenever reaction time was more than the subject's own median he was given an electric shock. Older subjects were slower to react than younger subjects, but shock reduced reaction times equally for both groups. When a regular series of PI's was used, the older subjects improved with shock more than the younger. The difference was confirmed with two additional groups of subjects. Botwinick, Brinley, and Robbin (1958b) studied the effects of exposure time on judgment of line length. Tasks at six levels of difficulty were administered to 34 subjects, median age 71, and to 26 subjects, median age 22.5. When exposure was reduced from 2.0 seconds to 0.15 seconds, latency of response was reduced, but so also was accuracy. The largest reduction in latency occurred for the older subjects on difficult discriminations, but even then their performance did not equal that of the younger group. Griew (1958, 1959) studied reaction time using lights: the number of lights from which the stimulus might come varied from one to eight, but in each case the same response had to be made. The performance of young subjects dropped only when sources were increased to eight, whereas that of aged subjects dropped when sources were increased only from one to two. In a further experiment, when the stimuli flashed on for less than 150 milliseconds, the disproportionate increase in reaction time of the older subjects did not occur. Both experiments were done with small numbers of subjects.

Many of the experiments described here used subjects from only two age groups, "young" and "old." At least three age groups are needed to draw reliable conclusions about age trends. The evidence did suggest, however, that older subjects were more cautious in their responses than younger ones and that in tasks where expectancy was constant their performance could be improved by increased motivation, for instance in the form of electric shocks. When stimuli were unexpected, older subjects were less able to deal with them, and performance could not be improved so easily.

Expectations, Set, and Attitude to Change

Talland (1959) studied the effect of expectation on reproduction of words heard at the threshold of intelligibility, with three groups of sub-

jects aged 20 to 40, 65 to 75, and 77 to 89. Subjects of all ages benefited equally by the introduction of a set, whether explicit or implicit. However, rapid shifting of sets or use of countersets caused a marked fall in performance with age. Talland noted that older subjects often remained silent if unsure of words. On inquiry, they sometimes said they had heard certain words, but disregarded them because they were not in the class expected.

Several studies showed that older people seemed less willing than younger ones to adapt their behavior with changes in stimuli. In Schaie's (1958) study, 500 subjects aged 20 to 70 showed a marked and approximately linear increase in personality rigidity with increase in age. Riegel and Riegel (1960) found that the type of item included in rigidity questionnaires appeared to influence responses. A marked increase in rigidity and dogmatism among 380 subjects over 55 compared with 120 subjects aged 17 to 19 was largely accounted for by the older subjects' more frequent agreement with clichés. Intelligence was not measured in this investigation. Chown (1960) found similar results in responses to a rigidity questionnaire by 200 subjects aged 20 to 81. She factor-analyzed a matrix consisting of the scale items, age, and measures of verbal ability and nonverbal ability. Three factors were found: normal obsessiveness, cliché agreement (related to low nonverbal intelligence), and liking for habit (which was most closely related to increasing age).

Older people also compared unfavorably with younger ones on tests which measured ability to change intellectual or motor performance, according to studies by Chown (1961), Mangan (1958), Mangan and Clark (1958), and Schaie (1958). This lack of flexibility was closely associated with fall-off in intellectual skill and motor speed.

In general, research tended to support the idea that there is diminished activity and social participation and greater cautiousness and rigidity of outlook with advancing age. Many of these variations in performance might, if found in young subjects, have been ascribed to differences in motivation. When several age groups were involved, however, the primacy of any one factor—decline in ability, decline in expectations, or decline in motivation—was not determined. Changes in drive and temperament probably interact with perceptual and intellectual characteristics, and it is quite possible that in complex behavior the change in any one condition may mimic that in another. For this reason, studies during the past decade, characterized by statistical analyses of interactions, could be followed to advantage by experimental studies designed to give a clearer picture of the psychological changes in older persons and their primary antecedents.

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CHAPTER V

Meaningful Learning and Retention: Intrapersonal Cognitive Variables

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MOST OF the discussion in this chapter will be confined to research in cognitive structure variables and in cognitive style. The influence of individual differences in intellectual ability on learning, problem solving, academic achievement, and creativity has been adequately covered in two previous REVIEW issues, "The Education of Exceptional Children" (December 1959) and "Educational and Psychological Testing" (February 1959). The learner's developmental readiness for different kinds, components, levels of difficulty, and methods of teaching of subject matter, as influenced by age-level differences in cognitive maturity, is obviously relevant in the context of intrapersonal cognitive variables and has been considered in Chapter I of this issue.

Cognitive Structure Variables

By cognitive structure is meant an individual's organization, stability, and clarity of knowledge in a particular subject-matter field relative to meaningful new learning tasks in this field (Ausubel, 1961). In the more general and long-term sense, cognitive structure variables refer to the influence of significant organizational properties of the learner's *total* knowledge in this subject-matter field on his future academic performance in the same area. In the more specific and short-term sense, cognitive structure variables refer to the effects of the organizational properties of just the *immediately* (or *proximately*) relevant concepts within a particular subject-matter field on the learning and retention of *small units* of related subject matter.

The importance of cognitive structure variables has been generally underestimated in the past because preoccupation with noncognitive, rote, and motor types of learning has tended to focus attention on such current, situational and intrapersonal factors as task, practice, drive, incentive, and reinforcement variables. It is true that the influence of prior experience on current learning tasks is conventionally considered under the heading of positive and negative transfer (or proactive facilitation and inhibition), but such transfer is generally interpreted in terms of the *direct* interaction between the stimulus and response attributes of the two overlapping but essentially discrete learning tasks (i.e., the recently experienced and the current).

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Theoretical Formulations of Cognitive Structure

Much more saliently than in experimental laboratory types of learning situations, typical school learning requires the incorporation of new concepts and information into an established cognitive framework with particular organizational properties. The transfer paradigm still applies here, and transfer still refers to the impact of prior experience upon current learning. But prior experience in this case is conceptualized as a cumulatively acquired, hierarchically organized, and established body of knowledge which is organically relatable to the new learning task, rather than as a recently experienced constellation of stimulus-response connections influencing the learning of another discrete set of such connections. Furthermore, the relevant aspects of past experience in this type of transfer paradigm are such organizational properties of the learner's subject-matter knowledge as clarity, stability, generalizability, inclusiveness, cohesiveness, and discriminability (i.e., cognitive structure variables)—*not* the degree of similarity between stimuli and responses in the two learning tasks. Further, recent prior experience is not regarded as influencing current learning by interacting *directly* with the stimulus-response components of the new learning task, except insofar as it modifies significant relevant attributes of cognitive structure. In an empirical test of this theoretical orientation, Ausubel and Blake (1958), using a proactive inhibition research design, demonstrated that meaningful learning and retention of a passage on Buddhism was not adversely affected by recent prior learning of interfering materials, for example, on Christianity.

Bruner's (1960) concept of "structure," in which he elaborated in a school learning context his previously published views on "going beyond the information given," was related to the concepts of cognitive structure and transfer as defined above. Mastery of the fundamental ideas of a discipline (its structure), he claimed, both makes the subject matter more comprehensible and easier to retain and facilitates transfer. Although these propositions, in their general form, had considerable face validity, Bruner's particular formulation was vulnerable on two counts. In the first place, he asserted that most specific memories can be forgotten with impunity as long as they are derivable or can be "reconstructed" when needed from those "generic" concepts or formulas which *are* worth remembering. Actually, however, relatively little school knowledge conforms to this derivative or "regenerative" model of memory in which the loss of specifics constitutes no great disadvantage in terms of academic achievement. New learning materials more frequently bear a *correlative* than a derivative relationship to established concepts in cognitive structure, and the forgetting of meaningful learned material, according to Ausubel (1960a), is largely a disadvantageous process of "oblitative subsumption" in which the identity of newly incorporated specific items is no longer dissociable from the more inclusive and generalized meaning

represented by the established concept under which they are subsumed. Second, in accordance with traditional usage, Bruner restricted the use of the term "transfer" to those instances in which "a general idea . . . can be used as a basis for recognizing subsequent problems as special cases of the idea originally mastered." However, Ausubel (1961) observed that in the vast majority of classroom learning situations where cognitive structure variables play a significant role, the transfer paradigm was more frequently applicable to the incorporation and retention of presented verbal material (i.e., "reception learning") than to "discovery learning" or problem solving.

Long-Term Studies: Improvement of Thinking

Despite their self-evident significance for school learning, long-term studies of cognitive structure variables involving subject-matter achievement were extremely sparse. Very little research in this area conformed to the minimal necessary research design (i.e., the transfer paradigm), which requires that a single attribute of cognitive structure first be deliberately manipulated, using adequate experimental and/or statistical control procedures, and that this altered cognitive structure then be related to long-term achievement outcomes in an extended program of new studies in the same field.

Promising attempts to enhance critical thinking ability by influencing cognitive structure in particular subject-matter areas were made by Abercrombie (1960), Suchman (1959, 1960), and Smith (1960). Abercrombie tried to improve medical students' ability to reason effectively by providing them with opportunities for "therapeutic" group discussion in an unstructured, nonauthoritarian atmosphere. Ability to analyze X rays was used as the criterion for assessing the effects of this training. Abercrombie's findings were generally in the predicted direction but were vulnerable on the grounds of failure to control for the Hawthorne effect.

Suchman (1960) experimented with the teaching of strategies and tactics of scientific inquiry to children to help them to learn to apply them in question-and-answer investigations. Preliminary findings by Suchman (1959) indicated that although such training increased the number of valid questions children asked in the test (criterion) situation, it did not significantly enhance the quality of the questions or facilitate grasp of concepts. Hence, more definitive evidence of the transfer value of such training to new situations was being sought, and the new criteria of transfer being employed were not only more independent of the particular training procedures used but also more reflective of the ultimate purpose of such training, i.e., greater knowledge of the content and/or the method of science.

Smith (1960), with Henderson's assistance, developed instructional materials designed to develop critical thinking abilities, and then helped teachers to learn how to handle these materials in the classroom. They

found wide differences among students of different teachers with respect to improvement in critical thinking, but refrained from drawing definitive conclusions because they had not yet devised a technique for describing and measuring what teachers were *actually* doing in this situation. Their next step, therefore, was to devise a method of categorizing the logical operations in thinking. The great value of this approach is twofold: First, it involves an attempt to influence critical thinking through the simultaneous teaching of both the logic of a particular subject-matter field and its content, rather than through general principles of logic; second, this category system promises to do much to place long-term classroom studies of cognitive structure variables on a sound experimental basis because of its attempt to quantify the crucially important but elusive teaching variable. Aschner's (1961) useful category system for classifying the thought processes reflected in verbal behavior was based on Guilford's conception of the structure of intellect.

Long-Term Studies: Influence of Existing Knowledge on Achievement

Studies in which the degree of existing knowledge of subject matter at one level of educational attainment was related to performance at subsequent educational levels also conformed to the long-term transfer paradigm. Constancy of academic attainment was, of course, attributable in part to constancy of academic aptitude and motivation. But, especially when these latter factors were controlled, it was reasonable to attribute some of the obtained relationship between earlier and later educational levels to the cumulative effects of cognitive structure variables.

Automated teaching and other forms of programed instruction appeared to exert a leveling influence on the relationship between the degree of existing knowledge and that of new learning in the same subject-matter area. Meyer (1960) obtained a correlation of $-.52$ between pretest scores on knowledge of English prefixes and gain in such knowledge after 10 days of self-instruction with a programed workbook. Little (1960) similarly found that drill machines giving immediate knowledge of results of practice tests in an educational psychology course, as well as opportunity to correct mistakes by drill, benefited those students most who usually scored in the lower half of the distribution. As a result of such teaching both the more and the less knowledgeable subjects moved upward in attainment, but the terminal achievement of the two groups tended to converge.

Long-Term Studies: Improvement of Instruction

Many of the curriculum-reform movements attempted to enhance long-term learning and retention by influencing cognitive structure variables. The University of Illinois Committee on School Mathematics (Beberman,

1958), for example, stressed initial self-discovery of generalizations by students, followed by precise, consistent, and unambiguous verbalization of modern concepts. The Secondary School Physics Program of the Physical Science Study Committee (Finlay, 1960) placed great emphasis on the integrative and widely generalizable concepts in modern physics; on inquiry in depth rather than on broad, superficial coverage of the field; on careful, sequential programing of principles; and on conveying to the student something of the spirit and methods of physics as a developing experimental science. Implicit in each program was the assumption that whatever ultimate superiority in academic attainment was achieved by following these pedagogic principles would be attributable to cumulative changes in the organization, stability, and clarity of cognitive structure.

Achievement-test data provided by evaluative studies of such programs offered presumptive evidence regarding the long-term effects of cognitive structure variables. Nevertheless, this type of research did not conform to the transfer paradigm, since the learning of *new* material in the same subject-matter field was not studied as a function of modified cognitive structure. Furthermore, not only was it impossible in such programs to isolate the effects of the individual variables involved, but also only rarely was any effort made to obtain comparable achievement data from control groups or to control for the Hawthorne effect. Measurement also was a difficult problem, because standardized achievement tests both covered various traditional subject-matter units deliberately ignored by these new curriculums and failed to measure knowledge of the more modern concepts which they emphasized. All of these difficulties pointed up the unfeasibility of using curriculum research as a source of rigorous experimental evidence bearing on a single cognitive structure variable.

Similar kinds of presumptive evidence regarding the long-term effects of cognitive structure variables came from studies of automated teaching. Pressey (1960) systematically used a self-instructional (punchboard) device as an integral part of a course in educational psychology. This device both provided immediate feedback and guided the student to the correct answer if he was wrong. Students using the punchboard made higher midterm and final examination scores than did control subjects. Little (1960) and Stephens (1960) reported similar findings. Nevertheless, although control groups were employed in these studies, the transfer paradigm was not followed, the effects of the drill and feedback variables were not isolated from each other, the Hawthorne effect was disregarded, and no attempt was made to equate experimental and control groups with respect to actual degree of exposure to relevant learning material.

Long-term experimental evidence derived from more modern teaching machine procedures is equally sparse. The study conducted by Skinner and Holland (1960) on programed instruction in introductory psychology, for example, was subject to all the methodological criticisms listed above in addition to the fact that control groups were not used. Porter's

(1959) study of programed instruction in spelling and Meyer's (1960) aforementioned vocabulary study were notable for the use of matched control groups, and the latter study also attempted to isolate the effects of single variables.

Despite the paucity of rigorous experimental work in this area, it was evident that, with proper controls, with manipulation of single variables, and with use of the transfer paradigm, automatic teaching devices could provide much valuable evidence on the long-term effects of cognitive structure variables. Programed learning procedures enhanced the stability and clarity of cognitive structure in two important ways: First, by supplying immediate feedback, they corrected wrong choice of alternative meanings, misinterpretations, ambiguities, and misconceptions before they had an opportunity to impair the clarity of cognitive structure and thereby to inhibit the learning of *new* material; second, by deferring the introduction of new material until prior material in the learning sequence was thoroughly consolidated, they maximized the effects of both stability and clarity of cognitive structure on *new* learning.

Short-Term Studies

Ausubel (1960a) proposed the use of organizers (i.e., advance introductory material at a high level of abstraction, generality, and inclusiveness) as a means of investigating programmatically the effects of short-term cognitive structure variables. By systematically manipulating the properties of organizers, it was possible to influence various attributes of cognitive structure (e.g., the availability to the learner of relevant and proximately inclusive subsumers, and the clarity, stability, discriminability, cohesiveness, and integrativeness of these subsumers) and then to ascertain the influence of this manipulation on new learning, retention, and problem solving. Such studies employed control subjects who were exposed to similar introductory materials, except for the particular variable under investigation, and hence followed the transfer paradigm. Ausubel (1960b) showed, for example, that when undergraduates were exposed to organizers presenting relevant and appropriately inclusive subsuming concepts, they were better able to learn and retain unfamiliar ideational material. Where the new learning material was relatable to previously learned concepts, as in the more typical classroom situation, the learner's ability to discriminate between the two bodies of material was obviously an important variable. Ausubel and Fitzgerald (1961) demonstrated that such discriminability was partly a function of the stability and clarity of these previously learned concepts (as measured by an achievement test) and that when discriminability was low because of inadequate prior knowledge, learning and retention could be enhanced by the use of "comparative organizers."

Several investigators used automated teaching devices in short-term studies of learning and retention, but they generally restricted their atten-

tion to the relative effectiveness of these devices compared to conventional classroom instruction. Coulson and Silberman (1960) and Evans, Glaser, and Homme (1960), for example, reported that university students, using simulated teaching machines and programmed textbooks, respectively, were better able to learn small units of meaningful material than were control groups employing comparable conventional methods. These studies also isolated the effects of such variables as size of step and mode and overt-ness of response. But unless the transfer paradigm is followed (i.e., until the effect of prior exposure to such factors was related to the learning of *new* material), the rich potentialities of these devices for increasing our knowledge of cognitive structure variables cannot be realized.

Information about the effects of cognitive structure on learning could be gleaned from many traditional studies of transfer of training. Morrisett and Hovland (1959) showed that transfer in learning set problems was a function both of mastery within a given type of problem and of experience with a variety of problems (i.e., generalization between problems). Goss and Moylan (1958) and Yarczower (1959) also demonstrated that the facilitating effect of verbal pretraining on concept formation was relative to the subjects' mastery of discriminative verbal cues during pre-training. Heterogeneous presentation of stimulus material that did not provide sufficient repetition to allow for mastery not only was less effective than homogeneous presentation in learning a principle but also, according to Sassenrath's (1959) data, did not facilitate during a transfer period the learning of a principle which was the reverse of the original. An incidental finding in this study confirmed the transfer value of furnishing to subjects feedback about the correctness of responses in the training series.

Evidence continued to accumulate regarding the mediating function of implicit verbal processes in concept formation. Liublinskaya (1957) and Kendler and Karasik (1958) showed that the availability of distinctive verbal responses facilitated concept formation and conceptual transfer; also confirming earlier findings in this area, Weir and Stevenson (1959) reported that *explicit* instructions to verbalize enhanced transposition learning in children and that this effect was unrelated to chronological age within the age range of three to nine. Mere ability to verbalize, however, may have constituted no advantage in certain simple transposition problems, inasmuch as "preverbal" preschool children seemed to do as well as "verbal" children (Rudel, 1958; Gonzalez and Ross, 1958). Both Sassenrath (1959) and Bensberg (1958) demonstrated that, even when the transfer task required the learning of a reversal principle, preliminary training on the original form of the principle, when accompanied by mediating symbolic processes, had facilitating rather than inhibitory effects. In support of Judd's classical research on transfer, Ervin (1960) found that verbal instruction in relevant physical principles underlying a given motor performance increased transfer to analogous motor performance in third-grade and fourth-grade children. This effect, however,

did not occur unless the subjects were able to perceive both the similarity between the two motor tasks and the link between verbal principles and performance.

The issue of directed *versus* independent discovery in learning and transferring principles was still very much in doubt, partly because of the difficulty of holding constant such other relevant factors as the rote-meaningful, inductive-deductive, verbalization, and motivational variables. Haslerud and Meyers (1958) concluded from a coding experiment that encoding practice was more transferable when coding principles were independently derived than when they were given. This conclusion was questionable, however, in view of the fact that their subjects exhibited significantly better initial learning on those problems for which the rule was given. Further, the less debatable of the two types of analysis performed showed no significant difference in score on a delayed test of code identification between problems originally learned by these two methods. Kersh (1958) did find significant differences in favor of a "no help" as against a "directed reference" and "rule given" group on a delayed test of ability to infer rules from arithmetic problems, but he also presented evidence suggesting that this superiority was attributable to the greater interest and drive instigated by the independent discovery procedure in the interval between the initial and later test, rather than to superior understanding or meaningfulness.

Cognitive Style

Research interest continued to be active in the area of "cognitive style," i.e., self-consistent and enduring individual differences in cognitive organization and functioning. Cognitive style refers both to individual differences in general principles of cognitive organization (e.g., simplification and consistency trends) and to self-consistent idiosyncratic tendencies that are not reflective of human cognitive functioning in general (e.g., intolerance for ambiguity; memory for particular kinds of experience). It reflects differences in personality organization as well as genetically and experientially determined differences in cognitive capacity and functioning. A serious methodological weakness common to many of the studies in this area was their utilization of measures of cognitive style, its determinants, and its functional consequences for which adequate intratask or intertask generality of function had not been established.

Holzman and Gardner (1960) used the Schematizing Test, with an odd-even reliability coefficient of .84 to .90, to measure leveling-sharpening tendencies. They found that "sharpeners" surpassed "levelers" in ability to recall anecdotal material. Berkowitz (1957) showed that leveling tendencies manifested significant generality of function and that "levelers" tended to prefer simple to complex phenomenal experience. Gardner and others (1959), employing a factor-analytic approach, isolated a limited number of control principles reflective of individual consistencies

in cognitive behavior. These factors differed for men and women subjects. "Retention style" was studied by Paul (1959), who found general and consistent individual differences with respect to importation, amount of material retained, and the use and retention of imagery.

Rokeach (1960) obtained evidence of a generalized "open-closed" dimension of belief systems measured by a Dogmatism Scale and an Opinionation Scale with respective reliability coefficients of approximately .80 and .70. In validating these scales he noted that Catholics made high dogmatism and right-opinionation scores, whereas Communists and religious disbelievers made high dogmatism and left-opinionation scores. Only the right-opinionation groups, however, tended to score high on the Berkeley Fascism and Ethnocentrism Scales.

Luchins and Luchins (1959), in reviewing the literature on rigidity of behavior and the effect of *Einstellung*, asserted that no conclusions were possible at that time as to whether a general and self-consistent factor of rigidity existed. The intratask generality of individual differences in the water-jar *Einstellung* test had not yet been determined, and the validity of this measure, as well as its relationship both to other measures of rigidity and to other personality traits, were highly equivocal. Rokeach (1960), on the other hand, presented evidence which suggests that "closed" and rigid individuals experience difficulty in synthetic and analytic thinking, respectively. In an investigation of intra-individual consistency in "the use of affect labels in describing and categorizing social and ink blot stimuli," Kagan, Moss, and Sigel (1960) were able to demonstrate significantly positive intercorrelations among their four measures.

Broverman (1960a, b) identified "conceptual *versus* perceptual-motor dominance" and "strong *versus* weak automatization" styles on a word-color interference test. He then demonstrated that "conceptually dominant" subjects were less distracted than "perceptual-motor dominant" subjects on a difficult conceptual task and that "strong automatizers" were less distracted than "weak automatizers" both on an automatized conceptual and on an automatized perceptual-motor task (Broverman, 1960b). Parallel kinds of results also were reported for the effects of these same cognitive style variables on intra-individual differences in response strength (Broverman, 1960a). The significance of these findings, however, was diminished by the failure to consider intratask or intertask generality of function either for the measures of cognitive style or for the measures of their effects.

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CHAPTER VI

Meaningful Learning: Motivational, Personality, Interpersonal, and Social Variables

FRANCIS J. DI VESTA

THIS CHAPTER deals with studies of the motivational, personality, and social-cultural variables affecting meaningful learning. The section on extrinsic *versus* intrinsic motivation surveys the motivating effects of instructions on ego involvement, level of aspiration, and achievement motive. The personality variables given greatest attention are anxiety, self-attitudes, authoritarianism, and values and interests. The section on research on social-cultural variables includes teacher-pupil and peer relationships as well as group *versus* individual learning settings and the learning-variable concomitants of socioeconomic status.

Extrinsic Versus Intrinsic Motivation

The first section of this chapter deals with studies of motivation contributing to the practical understanding of learning and achievement. The specific variables include those under control by the teacher or other outside source, those intrinsic in the learner as general personality characteristics, and those modifying motivation as a result of particular learning settings. Motivation is assumed to have both energizing and directive effects on performance, although the latter function is technically controversial since similar effects often may be attributed to learning or set processes.

Several volumes on motivation that are of general interest were published. Three issues of the annual *Nebraska Symposium on Motivation* (Jones, 1958, 1959, 1960) covered a wide range of theoretical positions and methodological problems in the investigation of motivation. J. S. Brown (1961) published an excellent integrative work dealing with the analysis of the concept of motivation and related empirical studies.

Motivating Effects of Instructions

Psychologists and educators are well aware that the behavior of their subjects and students can be manipulated by instructions. Sets, so induced, enhance performance through strengthening the associative processes by providing response-directed cues or through increasing the general drive level of the recipient by nonspecific directions to "work harder" or to "work faster."

There is little doubt about the influence of external stimulus control on the performance of the pupil. In four experiments based on principles from Skinner's laboratory, Keislar (1960) showed that neutral stimuli could be conditioned to have cue properties usable in new situations for producing new problem-solving activity, for indicating to the subjects when to learn, and for designating what they should learn. Rather than rely on the concept of interest, he offered a convincing explanation that variations among pupils in what they learn from a common experience depend on learning sets developed through prior histories of differential programs of reinforcement.

In another context, Bruner (1961) argued against heavy reliance by pupils on external rewards, such as parental or teacher approval, in the process of discovery, because these tend to develop conforming and rote behavior and to inhibit autonomous motivations. Discovery was presumed to demand self-reward resulting from information concerning the appropriateness of responses intrinsic to the task. To the extent that such motives of mastery or competence are developed, the role of external rewards as reinforcements in the shaping of behavior was said to be lessened.

Despite the theoretical controversies, the empirical evidence that motivation may be externally controlled was both consistent and convincing. Owen (1959) reported that children between seven and one-half and nine years of age who were told to "work faster" after a first task had lower reaction times than those who were given task-oriented instructions or instructions to "relax." Marvel (1959) found that verbal set for speed alone yielded greater gains in reading rate and retention than did the use of the tachistoscope, with and without the instruction. Entwisle (1961) reported that merely calling attention to a given body of subject matter (administering attensity) fostered learning irrespective of the means by which attention was directed.

Ego Involvement, Level of Aspiration, and Achievement Motive

A change in motivation was found to occur as a result of the manipulation of ego involvement after success or failure. Davids and White (1958), for example, showed that disturbed children's goal-setting after failure was most affected by the nature of the task (whether or not the task was like one in school in which they had previously failed), by the threat of loss of self-esteem, and by the threat of loss of the experimenter's admiration. The changes in level of aspiration ranged from extraordinary reduction to increase toward highly unrealistic goals. Successful pupils, according to Worell (1959), tend to hold aspirations close to previous performance. In an excellently conducted study, Rosenfeld and Zander (1961) demonstrated that disapproval of inadequate performance had no effect on aspiration level. Disapproval, when performance was as good as the student felt capable of, had negative effects on aspiration setting.

Indiscriminate reward lessened acceptance of a teacher's influence, while reward for adequate performance increased acceptance of the teacher's influence. Grades aspired to were more in line with actual grades when the teacher used reward power discriminately than when coercive power was used.

Relationship between the level of aspiration and the generalized motive to achieve was shown in several studies. The relationship between the achievement motive and performance was exemplified by French and Thomas' (1958) finding that subjects with high need to achieve were more likely to reach a solution in a problem-solving task than were subjects with low need to achieve. Although one study (Uhlinger and Stephens, 1960) provided only partial support for the hypothesis that high achievers have a greater need to achieve than low achievers, another study (Krug, 1959) demonstrated that when overachievement and underachievement are taken as a departure from a regression line based on aptitude and achievement measures, the achievement motive scale of the *Edwards Personal Preference Schedule* is the one scale that discriminates between the two groups. Weiss, Wertheimer, and Groesbeck (1959) reported that two measures of achievement motivation (McClelland's *Picture Story Test* and the need-to-achieve scale of the *Edwards Personal Preference Schedule*) in combination with an academic aptitude test proved to be powerful predictors of college performance. In attempting more precise formulations, McBee and Duke (1960) concluded that achievement was an additive, rather than a multiplicative, function of intelligence and motivation.

Personality Variables

This section is restricted to the personality factors that received most attention during the past three years. Of general interest was a carefully conducted and extensive study by d'Heurle, Mellinger, and Haggard (1959) in which they compared the personality patterns of high achievers in spelling, reading, and arithmetic. High general achievers were characterized by traits representing responsiveness to cultural influences; high arithmetic achievers by ego integration and maturity; high reading achievers by negative reactions to authority, by insecurity in relationships with adults, and by independence; and high achievers in spelling by passivity, by dependence on authority, by relative lack of imagination, and by inflexibility.

Anxiety

In terms of the number of published articles on motivation, the most popular motivational concept was anxiety. But despite the large proportion of publications in this area, definite conclusions still remained to be determined according to Reed's (1960) review of studies representing several theoretical orientations. He concluded that both severe and very low levels

of anxiety tend to depress learning; that mild anxiety may function in a positive manner for some kinds of learning; that variations in the reported effects of anxiety result from methodological differences; and that the multiple effects of anxiety cannot be accounted for by any single theory.

A systematic series of formal studies investigating anxiety in elementary-school children, by S. B. Sarason and others (1960), deserves careful reading by all involved in the study of learning.

An extensive factor analysis of anxiety was made by Cattell and Scheier (1958). One form of anxiety, labeled U. I. 24 (conscious anxiety), was tentatively related to verbal ability, arithmetic ability, and a wide variety of learning and achievement measures, for children but not for adults. This type of anxiety was characterized by ergic tension, guilt proneness, and emotionality. Phillips, Hindsman, and McGuire (1960), studying the U. I. 24 anxiety factor further, provided additional confirmation of its relationship to marks among adolescents. Nevertheless, the relationship of anxiety to achievement was far from clear-cut. Sex differences interacting with grade level (Morgan, Sutton-Smith, and Rosenberg, 1960), with educational level (Reese, 1961; Broen, 1959), with anxiety level (Grooms and Endler, 1960), and with achievement level within grade levels (Spielberger and Katzenmeyer, 1959) were among the factors shown to determine the prediction of achievement from anxiety.

Though it is assumed in correlational studies that anxiety is a chronic state of the individual, motivation from anxiety can be modified by manipulating situational elements. According to I. G. Sarason (1958), reassurance instructions facilitated the performance of high-anxious subjects and impaired the performance of low-anxious subjects on a complex learning task. The converse was found for standard or task-oriented instructions. Taylor's (1958) data indicated that high-anxious subjects were superior to low-anxious subjects under neutral conditions, but that reporting inadequate performance (stress) impaired the performance of all subjects. The foregoing studies and those by Wiener (1959) and Waite and others (1958) tended to confirm the idea that stress and/or anxiety produce responses that interfere, or are incompatible, with the learning task. Bardach (1960), S. B. Sarason and others (1960), and other researchers proposed further that when chronic or induced anxiety produces responses that are compatible with the learning task, performance is facilitated.

Self-Attitudes

Poor self-attitudes imply a lack of confidence that adversely affects general adjustment to the environment and proficiency in school. Roth (1959) tested the hypothesis that if demands for reading improvement are viewed as a personal threat the individual defends against the threat and maintains his self-concept. If these demands are nonthreatening, the self-concept is changed commensurate with, and including, new experi-

ence. Defense against the threat includes distortion of the experience so as to integrate very little of it into the self-concept, or withdrawal from the situation. Partial confirmation of the hypothesis was attained, since the attrition and nonimprovement groups were more defensive on measures of self as self than improvement groups and improvers seemed to show greater concern with self as student and self as reader after training. Although the technical presentation of this study was poor and some of the statistical analyses were naïve (both *t*-tests and chi-square analyses were made on the same data, for example, without an immediately apparent reason), the study was interesting in that it suggested the fruitful employment of the congruity and dissonance principles in the study of variables important to learning.

A procedure frequently employed in this area was to compare the self-attitudes of underachievers and overachievers. Frankel (1960) found that underachieving boys indicated more problems, particularly school problems, on the *Mooney Problem Check List* than did overachievers. The relationship of self-attitude to underachievement and overachievement also differed according to curriculums (Middleton and Guthrie, 1959) and college atmospheres (Holland, 1959, 1960). Aiken and Dreger (1961) found close relationships between attitudes toward mathematics and numerical ability among males but not among females.

Authoritarianism

The studies dealing with authoritarianism revealed that the associated characteristics of rigidity, hostility, and poor personal adjustment hinder learning of certain materials. Neel (1959), Hoffman (1960), and Frumkin (1961), for example, reported that the more authoritarian or dogmatic person had greater difficulty in the learning of unstructured tasks or tasks with a humanitarian philosophy than in the learning of factual materials. Kutner (1958) reported that a group of high-prejudiced seven-year-old children, compared with a low-prejudiced group, exhibited a high incidence of biased concepts, had difficulty in seeing relational attributes among stimuli, used concrete rather than abstract approaches, arrived at conclusions without testing hypotheses, and perseverated on unsuccessful hypotheses.

Values and Interests

Values and interests are assumed to be learned predispositions that, in a more general sense than other personality characteristics, have both energizing and directive functions in the control of behavior. Confirming this view, Winter (1961) reported that superior students and students in academic curriculums tended to hold traditional rather than emergent

values. Edwards and Wilson (1958) found that students having values indicating high prudence, that is, interest in the social significance of activities, had higher over-all academic grades. Those with primarily theoretic values, indicating interest in how things work, did not get higher grades even in science. The latter values seem to demonstrate a lack of differentiation between mechanical and heuristic problem-solving processes.

Social-Cultural Variables

The continuing interest in social influences was reflected in the studies of the effects on learning of teacher-pupil relationships, peer relationships, group *versus* individual problem solving, and social-class factors.

Teacher-Pupil Relationships

The literature in the area of teacher-pupil relationships dealt primarily with those characteristics of teacher style that appeared consistently in a number of situations. There were indications that the teacher's pattern of interaction with children may be related to emotional climate (Medley and Mitzel, 1959), to pupil perceptions of required and self-initiated work (Cogan, 1958a, b), and to the personality characteristics of the teacher (Ryans, 1959). Virtually none of the studies provided convincing evidence that teacher-pupil relationships affected the pupil's learning efficiency in any direct manner.

Flanders' (1960) exploratory study of the interaction between teacher style and pupil characteristics failed to confirm the hypothesis that dependence-prone pupils would achieve more with teachers using direct influence. Pupils of teachers using both direct and indirect influence in a flexible manner had higher academic achievement and scored significantly higher on classroom attitudes. Sustained patterns of direct influence tended to restrict learning and to produce less desirable attitudes. In testing a similar hypothesis, Beach (1960) found that socially oriented students achieved more in small groups and that less sociable students achieved more from lecture groups.

A few studies reported significant relationships between general climate indexes and academic achievement (G. I. Brown, 1960; Christensen, 1960; Davidson and Lang, 1960). It was apparent, nevertheless, that while some gains had been made in understanding the effects of teacher-pupil interaction on achievement, there was still a lack of positive and conclusive evidence. Gage (1958) implied skepticism that any relationship exists between one area of teacher-pupil interaction, that of the teacher's perceptions of pupils, and teacher effectiveness. His arguments were based on a summary of several carefully conducted and systematic investigations.

In a similar vein, Anderson (1959), after reviewing 49 studies dealing with authoritarian *versus* democratic leadership of teachers, indicated the lack of clear support for the superiority of one method over the other.

Peer Relationships

In the area of peer relationships the major concern was with peer acceptance. Ryan and Davie (1958) found a low positive relationship between social acceptance and grades. In a more analytical study by Williams (1958), achievement was more significantly related to acceptance extended to the group than to acceptance by the group. Hall and Gaeddert (1960) reported a moderately high relationship between friendship rating scales and grade averages of college students in fraternities and sororities. These results may necessitate qualification since, according to P. K. Brown (1960), social desirability discriminated the good from the poor performers among females in college population, but failed to separate the male students. In a detailed study of characteristics associated with sociometric choice status, Elkins (1958) reported a slight tendency for highly chosen children to be more intelligent and to achieve higher academic scores.

In general, there was considerable consistency in the findings of the studies reviewed. They indicated a significant positive relationship between social acceptance and achievement, whether the study was conducted with grade-school, secondary-school, or college populations. A more fundamental motivational factor has yet to be identified, since no cause-and-effect relationship could be inferred from these studies, all of which employed correlational designs.

Group Versus Individual Learning Settings

The greater efficiency of group over individual settings for learning may result from the provision for pooling the ideas that provide the basis for new associations, from an increase in motivation through mutual stimulation of members to increased activity, or from a reduction of anxiety. A comprehensive survey comparing group and individual performance on several variables was made by Lorge and others (1958), and a review of the relationship between personality and performance in small groups was published by Mann (1959).

Other more recent representative studies attested to the motivational influence of group settings. In a study conducted by Banghart (1959), the relationship between anxiety and problem-solving efficiency was significantly different between co-operative and un-co-operative groups when they were solving difficult problems but not when solving easy problems. Unfortunately, the author failed to present summary statistics describing the

level of each group's performance and thus precluded more analytical comparisons. Barnlund (1959) found that group decisions based on cooperative deliberations were superior to decisions based on individual settings or to decisions based on majority rule, particularly those following deadlocked decisions. The results were attributed to stimulation of greater task orientation and increased individual effort in the group settings. Related evidence presented by Faust (1959) indicated that the efficiency of *nominal* groups is less than that of *real* groups. The conclusions were indefinite, however, since more verbal than spatial problems were solved in one experiment than in the other. Hudgins (1960) reported the same general result for fifth-grade children, who were found to solve more arithmetic problems in groups than when working alone.

Socioeconomic Status

The specific values and attitudes associated with each socioeconomic level may be assumed to result in differences in general motivation and in ways of satisfying needs that will carry over to affect learning. Socioeconomic status was significantly related to several intelligence-test scores in a study by Knief and Stroud (1959) and to grade-point average in a study by Pierce-Jones (1959). In both cases the correlations were higher for teen-age boys than for girls. Gibboney (1959) found that, after studying a social-studies unit, sixth-grade pupils from upper-middle-class homes changed toward a greater acceptance of Mexicans, although the change was not significant, while the children from upper-lower-class homes changed significantly toward a rejection of Mexicans.

The effects of mobility tend to counteract the relationship between socioeconomic status and achievement. According to Udry (1960), status measures in a new community were not related to the achievement of pupils. Washburne (1959) concluded that the family's socioeconomic level has nothing to do with academic performance once the student gets into college.

Two other studies deserve particular attention. Mohandessi and Runkel (1958) conducted a unique study of the socioeconomic characteristics associated with high and low *Differential Aptitude Test* scores of pupils in more than 100 schools in Illinois. In a study by Terrell, Durkin, and Wiesley (1959), social class and kind of incentive were found to interact in affecting the degree of learning in a discrimination learning task. Middle-class children learned more rapidly with a nonmaterial reward (a flashing light) and lower-class children learned more efficiently when candy was used as an incentive. The differences were explained in terms of values associated with imaginative activity and material reward in the respective classes. While this conclusion seems plausible for the lower-class children, it appears less plausible for the middle-class children, since both incentives should have been effective.

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CHAPTER VII

Meaningful Learning and Retention: Task and Method Variables

NORMAN D. BOWERS

PRESENTATION of material to maximize pupil learning and retention is a major problem confronting the classroom teacher. Obviously, great variability is possible both in the instructional materials and in the methods of presentation. Materials may vary in such factors as difficulty, sequence, potential meaningfulness, redundancy, and internal organization. Presentation may vary according to such characteristics as type of classroom organization, teaching style, and procedure (lecture, discussion, or recitation). Variability stemming from materials is, in this chapter, termed *task variable*; variability stemming from the procedures used by the teacher is termed *method variable*. In the classroom learning situation, task variables require reaction by a pupil to a demand or suggestion of the teacher, other pupils, or the pupil himself. Method variables are basically those teacher behaviors that condition the learning situation in the classroom.

Studies related to teaching, instructional materials, and administrative procedures were reviewed in recent issues of the REVIEW by Bellack and Huebner (1960), Ellis (1960), and Herrick (1960). These reviewers, however, drew extensive attention to studies not specifically concerned with the criteria of pupil learning and retention.

Task and method variables and their effect on learning and retention are the primary concerns of this chapter. Although task and method variables may be considered separately, it is doubtful that they constitute a dichotomy. Certainly, some tasks require an emphasis on particular methods, and in this chapter joint task-method emphases denote such situations.

The effect of the teacher's knowledge on pupil learning and retention is an additional topic of concern in this chapter.

Task Variables

Although research dealing with task variables seemed insufficient in quantity, such studies as were completed during the last three years showed sophistication in their conception and procedure. The weakness of individual studies lay, perhaps, in the authors' failure to interpret findings or give specific suggestion for their implementation in a classroom

situation. Exceptions to this criticism, however, can be found in at least two studies, both dealing with tasks related to the initial phases of teaching (Wittrock, 1960; Armistead, 1960).

Wittrock (1960) was concerned with the problem of how teachers could facilitate a transition of specific background knowledge possessed by a pupil into the pupil's cognitive system of new, related information. Each of three groups (a total of 198 secondary-school pupils) was given one of three sets of directions: to look for similar, different, or neutral statements in two written passages. After analyzing data according to a factorial design which involved the three different sets of directions, grades, sex, and two intelligence levels, Wittrock concluded that subjects categorized and related materials in accordance with instructions. It appeared effective to direct pupils in the task of searching for similarities when they are present, or differences when differences are present, with an explicit statement that materials are basically similar or different. Such findings should be considered as teachers start new units of work.

Useful conclusions also were drawn from the study by Armistead (1960) dealing with the effect of stimulus change on exploratory drive. Sixty primary pupils, stratified on the basis of intelligence, were subjected to three experimental conditions involving repetitious materials. Armistead found that children of higher intelligence required more stimulus change to maintain high performance and that exploratory drive in children of lower intelligence could be sustained at a comparable level with less environmental change. It seems that overlap with previously learned material should be considered concurrently with the intelligence level of pupils, and provisions should be made accordingly for stimulus change.

A study by Webb and Schwartz (1959) seemed to indicate that length of material to be learned is, in itself, not as important as are other factors in the learning situation. They found that as the amount of information to be learned was increased, the variance in learning increased only to a point; error variance, however, continued to increase. They suggested that this latter increase might be attributed to such factors as fluctuation in attention, methods of learning, proactive and retroactive effects of inhibition, and guessing as a result of failure to recall.

In an applied study aimed at identifying specific kinds of difficulties affecting the learning of shorthand dictation materials, Hillestad (1960) found that error rate increased as words became longer. Gladis (1960) investigated transfer in grades 3, 5, and 7, varying the time interval between two verbal learning tasks. Results indicated that kind and amount of transfer may be functions of developmental factors.

Muehl (1959) reported a somewhat novel study dealing with recall, in which he used three tasks that involved meaningful material (recorded stories, paired adjectives, and paired picture names). He found no consistent differences in recall ability when differences in learning were held constant. This finding suggests that much of the variance in recall is attributable to variation in original learning.

Additional References: Al-Karbouli (1960); Haslerud (1959); Little (1960); Mills (1959).

Method Variables

Research dealing with method variables involved classroom organization, presentation procedures, and methods of evaluation and grading. Variations in classroom organization usually included such items as grouping, team teaching, and ungraded classes. Presentation procedures included independent study, project methods, lecture, discussion, recitation, and, usually, teaching style variables, i.e., how a teacher encourages a pupil to learn through discovery-directed, inductive-deductive, and laboratory-textbook approaches.

In a fair proportion of recently completed studies of method variables, results from experimental and control methods did not show statistically significant differences. Inferences should be drawn with caution, however. Lack of statistically significant differences does not imply that methods are equally good or indifferently appropriate. Demonstrating the effectiveness of any teaching method requires highly sensitive procedures in design and analysis. Bowers and Soar (1961) noted that before differences in method variables can be shown, concern must be manifested for the large number of measurable complex outcomes, for the numerous and elusive covariates that mask true differences between methods, and for the frequent inability of simple statistics to make possible adequate analysis of the data. Imaginative designs are needed.

Classroom Organization

The effects on learning of organizing a classroom into varying sizes and kinds of groups continued to receive considerable attention. Manning (1959) reported an evaluative study designed to develop a program of instruction "to serve individual learning needs." His data were analyzed in terms of the relative achievement of experimental and control groups of pupils in social studies, literature, and science. Findings suggested that the effects of individualization procedures vary both with pupils and with subject-matter area. For example, an experimental group of sixth-grade pupils in science and literature with IQ's of 120 and above made significant improvement; however, fifth-grade pupils in social studies, of the same ability level, made less progress than control pupils did. Although such results in classroom practices seem confusing, this type of experimental approach seems worth encouraging and repeating with necessary modifications until clarity is achieved. Only after more of this kind of research can we hope to determine which kinds of students can benefit in which subject areas from individualized programs in learning.

"Grouping: Promising Approaches" was the theme of an entire issue of *Educational Leadership* (1961). Although the four articles reported no research studies, their interpretation of research findings for curriculum practices and their suggestions about needed research should be helpful in planning attacks on the problem.

Three studies, all somewhat sophisticated in planning and analysis, reported no significant differences in learning outcomes between individual, small-group, and large-group methods. In studying a group of 128 fourth-grade pupils, half working in groups and half as individuals, Hudgins (1960) found no differences in individual problem solving. Siegel, Adams, and Macomber (1960) compared retention of information between two sample groups of college students matched on *ACE Psychological Examination* scores and found no significant differences in the effectiveness of large-group and small-group instruction. Wallen and Vowles (1960) compared a nongrouping procedure with a grouping procedure for four classes of sixth-grade pupils in arithmetic, equated on the basis of pre-test achievement scores. Although no significant differences were found between these procedures, significant differences were reported between teachers and for teacher by method interaction. The latter suggested that some teachers were more successful in using a given method than were others.

On the other hand, Blue (1958) reported significant results in a study of college students in a sociology course. Students who studied in groups made higher achievement scores than students who studied independently. The data also indicated that all but the exceptional student improved when studying in an organized group. Beach (1960) used lecture, discussion, and small-group and independent study procedures in organizing an advanced course in educational psychology. He concluded that the less sociable students achieved more by lecture and that the more sociable students achieved more by the small-group procedure. McHugh (1960) worked with fourth-grade, fifth-grade, and sixth-grade pupils over a two-year period in an effort to initiate and evaluate team learning in such skill subjects as arithmetic, spelling, reading, and language. In general, the achievement gain apparently attributable to this procedure was significant for grades 5 and 6; no gain was reported for grade 4. Reading and language improved in grade 6, arithmetic in grades 5 and 6, and spelling in all grades.

That pupils' feelings are important in learning was indicated by Morgan and Stucker (1960), who found that an experimental method of teaching reading, the Joplin Plan, was superior to a traditional method. It was suggested that the new approach was better because it permitted teachers to offer more effective verbal and emotional rewards and allowed the slow student to function in a nonthreatening atmosphere which maximized positive feedback.

Additional research is suggested by these studies. Maturation factors and skill or previous experience in group procedures seem to be involved.

Pupils with certain characteristics seem to profit from experience when working with cognitive materials of a given kind, under the direction of certain teachers.

Additional References: Abramson (1959); Boesel (1960); McDougall (1958); McKeachie and others (1960); Schellenberg (1959); Smith (1960).

Presentation Procedures

A teacher's procedures for presenting material, obviously, must be related to his classroom-organization pattern. Using a variety of procedures and organizational plans, Nesbitt (1960) completed an extensive study involving pretest, post-test, and retention measures. Although each class achieved significant growth irrespective of the procedure (whether traditional or team teaching and whether or not teacher aides and modern educational media were used), no consistent differences in retention scores were found. It seems possible, however, that an over-all Hawthorne effect masked differences between methods.

In a study concerned with factual material, Robinson (1960) found that the addition of a lecture to an exhibit improved results, regardless of the arrangement of the exhibit. Some of the findings of Nachman and Opochnsky (1958) bear on circumstances in which lecture procedures appear to be effective. When quizzes were given without warning, material specifically covered in the lecture seemed to be recalled better by students in a small class setting than in a large one, although when students had studied for the final examination, scores for the classes did not differ.

Both of these latter studies question how much direction by the teacher is desirable and how different teaching really is from telling. Moss (1960) concluded that the direct-instruction and directed-discovery methods were equally effective with respect to initial learning, retention measured at one week and six weeks, and transfer of technical content after six weeks. The methods also did not seem to operate differentially for individuals of different intellectual ability. Similar results, in part, were obtained by Ray (1961), who found no differences between the direct-instruction and directed-discovery methods with regard to initial learning and retention at one week. The directed-discovery approach, however, was significantly better in terms of the pupils' retention at six weeks and their transfer at both one and six weeks. It is possible, of course, that task differences in these two studies might account for the differences in findings. Moss's (1960) study dealt with letterpress imposition, whereas Ray (1961) was concerned with micrometer principles and skills. Although a more abstract task (maze learning) was used in Aronov's (1958) exploration of the effects of consistent and inconsistent guidance on learning and transfer, his findings probably are related to those of Moss (1960) and Ray (1961). Aronov concluded that inconsistent guidance results in lasting damage to

learning if, for some reason, the recipient is unable to rebel or to ignore the guidance.

These studies were, in general, carefully done, but the use of small experimental populations is regrettable. Although classroom procedures run the risk of being overspecialized and lacking in generalizability, they are a promising area of research.

Additional References: Catterson (1959); Cummiskey (1960); Klugh, Deterline, and Henderson (1960); Marr and others (1960); Olson (1959); Popham (1961); Rivkind (1958); Swick (1960); Taylor (1959).

Evaluation Techniques

Duel (1958) found that when students were given periodic opportunities for self-evaluation, they made higher achievement scores than did students who were not given such opportunities. The results of a study by Bartlett, Ronning, and Hurst (1960) suggest that case studies are worthwhile and justifiable in evaluating ability to apply knowledge. Although evaluation procedures can be considered task variables, the emphasis in this study is on teachers' methods. For example, Page (1958) found that comments written on students' papers by secondary-school teachers had a measurable and significant effect on students' effort, attitude, and attention. There was no evidence that poorer students were less responsive than better students. Senior high-school students were more responsive to teacher comment than were junior high-school students.

Although the methods and techniques of test construction are well known to most teachers, there is opportunity for fruitful research in the improvement of learning and retention through evaluation. Little attention seems to have been directed to the comparison of evaluative techniques for this purpose; in fact, the organization of many schools seems to negate such efforts, and tests are too often seen only as evidence of having absorbed a given block of material.

Additional References: Eisner and Rohde (1959); Fattu (1957); French (1960); Kalish (1958); Standlee and Popham (1960).

Teacher Factors

The selection of both tasks and methods depends on factors inherent in the teacher. What the teacher knows and the effect of the teacher's knowledge on pupils' retention of learning are of concern in any consideration of task and method variables. The teacher's attitudes and behaviors also influence pupils' learning; this was shown, at least with regard to attitudes and behaviors having strong emotional tones, in a study reported by Torrance and Mason (1958). They studied the effects of various approaches by the instructor on a sample of Air Force personnel and

concluded that a direct "take-it-or-leave-it" approach was more effective than personal persuasiveness or setting an example. They also found that attempts to influence attitudes were more effective in the instructor's official role than in his personal role. Replication of this study using younger subjects would be desirable to test the generalizability of findings to include elementary-school and secondary-school situations. Other studies dealing with teacher influence are reviewed in Chapter VI.

Two studies seemed to indicate that relationship exists between teachers' knowledge and pupils' learning. Massey and Vineyard (1958) found significant correlations between students' college achievement records and global ratings of first-year teaching performance. Bassham (1960) found that teachers' understanding of mathematical concepts was significantly related to pupils' gain in arithmetic for students classified above the class mean, but not for those below. Inferences from these findings must be further qualified by the negligible correlations obtained by Heil, Powell, and Feifer (1960) between teachers' knowledge and pupils' achievement in the elementary grades.

Cohen's (1960) study showed that the procedures most teachers used for gathering information about students probably stimulated pupils' learning.

There is a continuing need for well-designed studies dealing with characteristics of teachers. Klausmeier (1961) aptly summarized the situation in a statement that needs specification and validation: "Cognitive and psychomotor abilities of teachers correlate lower with teacher success than do the same abilities of students correlate with . . . [the students'] success on school learning tasks. Efficiency of pupil learning, however, is enhanced when guided by a teacher who is intelligent, well prepared in the subject matter, a high achiever while in college, and generally well educated." It already has been demonstrated that teachers can learn different classroom approaches (Bowers and Soar, 1961), that valid assessment of teaching can take place (Hughes and others, 1959), and that individual differences in a variety of teacher traits exist (Turner and Fattu, 1960). The approach of Newell, Lewis, and Withall (1960) and the continuing research reviewed in Chapter VI promise to be of interest.

Task-Method Emphases

As indicated earlier in this chapter, task and method variables that affect learning and retention outcomes can seldom be dichotomized. Certain kinds of learnings reflect unique combinations of both task and method. What a teacher does (method) to promote pupil activity (task) that will result in learning and retention can be considered in terms of emphasis on such items as fundamental concepts, logical and critical thinking, and meaningful, positive learning sets. Ironside (1959) completed a study illustrative of task-method emphasis. He compared three related

teaching procedures for effectiveness in developing context clues for vocabulary development. Working with 211 pupils, with two equivalent tests of context-using ability, he found no differences in the results in classes taught deductively (in which the names and uses of five different clues were the subject of lectures), inductively, and by a combination procedure. The contrast in method may have been weakened by a Hawthorne effect.

In an effort to determine the relationship between kinds of memory and problem-solving ability, Hoffman (1960) administered a series of tests of various kinds of memory to 123 eighth-grade pupils. He identified the superior and poor problem solvers and compared their memory test scores. Although no relationships were found between problem solving and memory span, immediate recall, or delayed recall, significant relationships were found between problem-solving ability and incidental memory.

Educators need to be concerned not only with problem solving and memory but also with the development of such skills as critical thinking and listening. Representative studies in these areas were made by Herber (1959) and Trivette (1961). Herber found that ability to think critically could be improved by introducing specially prepared materials to pupils in grades 10, 11, and 12. Trivette concluded that training in specific listening skills could be accomplished by teachers, and that as listening skills improve, other comprehension skills also tend to improve.

In the area of concepts, there were three interesting studies which suggested additional needed research in the task-method area. Davis (1958) experimented with the development of certain time and space concepts by fourth-grade, fifth-grade, and sixth-grade pupils. Experimental classes were taught a unit specifically employing materials relating to the development of understandings about geographic time zones. Pretest, post-test, and retention-test scores served as the criteria, and intelligence was controlled through analysis-of-covariance procedures. By the end of one month, the experimental classes had gained significantly more in understanding than the control classes; no significant differences between grade levels were noted. Significant differences between grade levels and between the experimental and control groups were found at the end of the experiment. Thus, specific instruction in time and space concepts appeared valuable for pupil learning and retention.

Emphasizing specific instruction in chronology, Arnsdorf (1961) investigated a seven-week instructional program that fostered comprehension of definite and indefinite time terms, ability to recognize relative lengths of time between periods, skill in ordering events with dates, and competence in recognizing time absurdities. He concluded that through systematic instruction children can increase their understanding and their ability to use time relationships.

Using a design similar to that employed by Davis, Nelson (1958) in-

structed teachers in methods of teaching light and sound concepts. Pupils showed significant gain related to grade level.

These studies all seemed to indicate that when certain tasks are taught by appropriate methods, growth in concepts takes place. The occasional relationship of additional information gained and grade level suggests that research workers might concern themselves with the long-standing question of desirable scope and sequence in the school curriculum, and in particular, with the relation of sequence to the difficulty of tasks and the appropriateness of methods at different grade levels. As Davis (1958) suggested, the question is not, "What do children know?" but rather, "What can children learn?"

Additional References: Baldauf (1960); Cox (1960); Jacobs and Bollenbacher (1960); Parnes and Meadow (1959); Pimsleur (1960); Rothstein (1960).

Conclusion

Problems of research dealing with task and method variables will probably continue for some time. However, creative designs, well executed, and analyzed by sophisticated procedures, can help clarify them. Experimentation with tasks having plausible relationships to classroom behaviors of both pupils and teachers seems indicated. Needed also is research dealing with teachers' knowledge and its effect on pupils, on scope and sequence of specific subject materials, and on productive methods by which teachers may make evaluative procedures an integral part of the learning process. Research in these areas, however, must be anchored to a theoretical base if lasting value is to accrue.

Hullfish and Smith (1961) produced a provocative book on educational theory that may be helpful to research workers in formulating studies dealing with task and method variables. One of their points implies some rather specific advice, particularly when interpreted against the background of this chapter:

The point of attack in bringing about a significant reconstruction of education—in the classroom where mind meets mind—is the reconstruction of the teacher. It is this organization that is essential for the creation of a reflective learning atmosphere. What finally counts in any reorganization of the curriculum, in short, is this reconstruction of the teacher.

A second work, in progress, also holds promise for directing the efforts of research workers. The current five-year study by Smith and others (1960) of the logic of teaching includes exploration of teaching as an independent phenomenon. If this study does indeed identify, classify, and analyze the operations of teaching as its researchers hope, research dealing with meaningful learning of pupils in the classroom will indeed be enhanced.

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CHAPTER VIII

Meaningful Learning and Retention: Practice and Reinforcement Variables

JOHN D. KRUMBOLTZ*

INTEREST in the application of reinforcement psychology to meaningful school learning situations has developed rapidly in the last three years. Much of the interest was generated by the development of the teaching machine and programed learning approach, which provided a technique for investigating systematically some of the variables involved.

Noteworthy reviews of related literature were prepared by Krasner (1958), Salzinger (1959), Lewis (1960), Silverman (1960), Bandura (1961), and Stolurow (1961). Following Skinner's (1958) classic description of the principles and possibilities of teaching machines, there were two compilations of relevant articles, by Galanter (1959) and Lumsdaine and Glaser (1960).

This chapter categorizes selected research findings under four problems in learning: (a) evoking the desired response, (b) reinforcing the desired response, (c) maintaining and improving the desired response, and (d) eliminating the undesired response. Much of the literature under these headings reported experimentation with programed materials.

Evoking the Desired Response

Use of Prompts

An important problem, which received little attention, concerns the most efficient methods of cuing the learner. One issue is the relationship between prompting and confirmation. How many (if any) and what kinds of cues are most likely to be followed by the learner's correct response? What arrangement of confirmations after the response and cues before the response produces optimal learning? On these questions no experimentation with meaningful learning was located, but Angell and Lumsdaine (1960) found that a sequence of three prompting trials followed by a confirmation trial produced better learning of paired associates than prompting trials alone. They hypothesized as follows: "Have the learner respond to the minimum value of cue strength which is sufficient to insure a correct response." Research with more meaningful learning tasks

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is needed to validate this principle; if future research should support it, teaching machine programs with overdetermined responses could be improved. The emphasis on errorless learning resulted in some programs in which more cues were provided than were necessary to insure the correct response. Consequently, the learner might make the right response by attending to an irrelevant cue.

S. R. Meyer (1960a) reported a study of the error rates associated with different kinds of prompts in teaching eighth-grade students English roots and prefixes with a programed textbook. She found, for example, that relatively few errors (3 percent) were made when the correct response was the same as an emphasized word in the frame. Most of the errors (59 percent) were made when the prompt called for the student to perceive an analogy between two examples. No generalizations about the relative difficulty of prompts should be formed from these data, however, because of the few frames of each type involved, the uncontrolled difficulty level of the words in each frame, and the fact that some categories of prompts were specific to her particular program. One of the pressing needs was for a generally applicable and theoretically based taxonomy for prompts. Useful approaches were developed by Skinner (1958), Gilbert (1960), and Homme and Glaser (1960).

Construction Versus Selection of Responses

With a few modifications, the old battle of the essay test *versus* the objective test can be refought on the question of whether the learner should be asked to compose his own response or select it from a list of alternatives. A resolution may be just as difficult to achieve, since the choice of a criterion appears crucial.

Of the four research studies on this question, two concluded that constructed-response (fill-in) programs produced more learning than multiple-choice programs when the criterion test was also of the constructed-response variety, but not when it was an objective test. In the other two studies no significant differences were noted.

Coulson and Silberman (1960) used part of the Harvard program in elementary psychology, which was later published (Holland and Skinner, 1961). They found that on a 19-item constructed-response criterion test the constructed-response format was superior to the multiple-choice format only when a nonbranching (all students take all steps) program was used. However, the constructed-response format required an average of 54 minutes in comparison to 44 minutes for the multiple-choice type program.

Similar results were obtained by Fry (1960) with his Spanish-English vocabulary program, which, however, was not a continuous-discourse program. It consisted of 16 English words; the student first supplied the Spanish translation and then checked the correctness of his response.

On an eight-item constructed-response test, the constructed-response format produced superior learning over a multiple-choice format, as measured by both immediate and delayed tests, even when learning time was held constant for both groups.

No such differences were obtained by Roe and others (1960) when freshman engineering students studied elementary probability by different methods, including both multiple-choice and constructed-response teaching machine programs. A similar failure to find significant differences was reported by Evans, Glaser, and Homme (1960b) with a symbolic logic program. They explained the absence of significant differences in studies of this kind with the following hypothesis: "The relevance of variables such as response mode and immediacy of confirmation is inversely related to the probability of correct responding." This hypothesis is consistent with the results reviewed here. Thus, in a program in which there is a high probability of a student's answering each element correctly, as in the studies by Roe and others (1960) and by Evans, Glaser, and Homme (1960b), the form of his response is unimportant. But when the initial probability of a correct response is low, as in the Fry Spanish-English program, the form of response becomes more critical. Since the difficulty level of Coulson and Silberman's (1960) program was not reported, interpretation of their results in light of the above hypothesis is not possible.

Overtness of Response

How important is it for the learner to make overt response during the learning process? Although some response appears theoretically desirable, the seven studies on this topic failed to show any advantage for learners instructed to make overt instead of covert responses. Indeed, some studies showed that the instructions consisting of simple direction to read programmed material that had the answers already written in the blanks appeared to be at least as effective as, and far more efficient than, any other procedure. This conclusion must, of course, be tempered by the limitations of the studies themselves.

Silverman and Alter (1960) reported that the 30 undergraduates who read the programmed items on basic electricity without overtly responding scored significantly higher on an eight-item fill-in test than the 30 students who filled in the blanks on the program. No information was given in the one-page article on such factors as the difficulty or length of the program, the time allowed each group, or the method of assignment of subjects to treatment.

An experiment by Goldbeck, Campbell, and Llewellyn (1960) compared the relative effectiveness of four modes of response: overt, covert, optional overt or covert, and reading. The 32 frames of the program on

light had an average difficulty level of 84 percent for the 62 eighth-grade pupils. A quiz administered immediately after the program revealed no significant differences among the means of the four response modes, although the mean obtained for the reading mode was slightly higher. Since the reading mode was accomplished most quickly by the students and the written overt mode required the longest time, an index of learning efficiency greatly favored the reading method of presentation. The use of efficiency indexes such as this may be dangerous because of the nature of the scales involved.

An interesting side light on this experiment concerns the amount of time required for students to complete the criterion quiz under each condition. The students in the reading mode required the longest time, whereas students in the overt response mode required the shortest time—directly the reverse of the amount of time taken to complete the program. A possible interpretation is that the reading group was not as certain of its responses and thus might not have been able to retain the material as long as students under the overt response condition.

Evans, Glaser, and Homme (1960a, b) reported two studies in which overtness of response was investigated. In neither case could significant differences be found, although the small number of students in each treatment group did not allow for a very powerful test of significance.

Kaess and Zeaman (1960) investigated the overtness of response variable with multiple-choice type questions. The learning material consisted of 30 multiple-choice test items on psychological terminology, arranged in no logical sequence. Students who merely observed the correct underlined answer did as well as students who observed the correct answer and also punched that answer on the punchboard.

Roe and others (1960) found that the programed textbook which required no overt responses took significantly less time to complete and resulted in a slightly, though not significantly, higher score on the criterion test than did the programed textbook which required written responses.

In a task involving the learning of light circuits, Hillix and Marx (1960) found that students who learned by their own trial and error had more difficulty than those who watched someone else make the same trials and errors. However, on trials with material to which the learning should transfer, the overtly responding group showed a slight superiority.

Although all the evidence so far reported fails to support a presumption of the importance of overt response, the question should not be considered settled. The studies reported here were based on very short programs or learning tasks. The criterion tests were always administered immediately after the completion of the program, and no delayed measures of retention were obtained. Goldbeck, Campbell, and Llewellyn (1960) mentioned a previously conducted study (currently unavailable) in which the difficulty level of the individual frames in the program was related to the importance of overt response. Overt written responses were more effective with difficult material, but covert responses proved more efficient with easy material.

Such a finding is consistent with the hypothesis of Evans, Glaser, and Homme (1960b) mentioned previously.

Reinforcing the Desired Response

Effectiveness of Reinforcers

The well-documented principle that the learner performs best when given knowledge of results received additional support in a variety of contexts. Oakes, Droge, and August (1960) demonstrated the reinforcing effects of a signal light which informed group discussion participants of the presence or absence of psychological insight in their comments. Those receiving positive reinforcement emitted progressively more words toward the end of the discussion than those who had been signaled that their comments indicated a lack of psychological insight. In a similar follow-up study the same authors (1961) discovered that the content and conclusions of a group discussion can also be influenced by reinforcement supplied to the participants. Since the subjects were psychology students, discussing psychological problems and being reinforced by a professional psychologist in their display of psychological insight, it is not surprising to find that their conclusions were influenced by the reinforcement. There is need for further experimentation designed to isolate each of these influences: type of learner, nature of subject matter, response category to be reinforced, prestige of the reinforcement administrator, and nature of the reinforcer.

If knowledge of results is to be used as a reinforcer, how should the learner be given the results? Should each response be followed by *right* or *wrong*, or by *right* or nothing, or by nothing or *wrong*? Curry (1960) and Meyer and Seidman (1960, 1961), in several studies on concept formation, investigated this problem with fairly uniform results. In general, when children were told that their incorrect responses were *wrong* and when their correct responses were either ignored or called *right*, they developed the correct concept more quickly than when correct responses were called *right* and wrong responses ignored. The reason for this result probably is related to the nature of the learning task involved. As Meyer and Offenbach (1961) pointed out, the word *wrong* is probably more effective because it conveys more information than *right* when many irrelevant cues are present in the two-choice problems. The word *right* positively reinforced responses to such irrelevant cues as the color, height, or shape of blocks when the relevant cue was, for example, area of the base. Their experiment confirmed a significant interaction between task difficulty (number of irrelevant cues) and reinforcer combinations. Only when two or three irrelevant cues were present did the *right*-nothing combination prove inferior. With only one irrelevant cue, *right* became just as informative as *wrong*, and no significant difference in rate of learning was observed. The implications of this finding are consistent with the previously quoted hypothesis of Angell and Lumsdaine (1960) that the learner

should be provided only the minimum number of cues necessary to produce the correct response. Too many hints may enable him to give the right answer in response to irrelevant cues.

Does providing the correct answer after a response produce better learning than mere knowledge that the response was right or wrong? It does, according to Bourne and Pendleton (1958), in a geometrical concept formation task, and according to Chansky (1960), who asked students to learn age expectancies of items in the *Vineland Social Maturity Scale*. Complete information was more useful than an evaluative reinforcer. However, Donahoe's (1960) study suggested the possibility that too much unassimilated information feedback can impede the solution of a two-dimensional geometric game.

Kaess and Zeaman (1960) reported a study in which they compared the effects of the number of distracters in multiple-choice items on student learning of 30 psychological definitions. The fewer the number of distracters presented initially, the more quickly the students mastered the definitions in subsequent trials. An analysis of errors showed that students made the same errors repeatedly, although they were consistently provided with information that they were wrong. Students who were initially provided with only the correct answers made the fewest errors on all subsequent trials. Such a finding strengthens the prompting argument of insuring that a student's first response is correct. To summarize the findings so far, then, the ideal teacher is one who can provide no more than the minimum number of relevant cues to guarantee a student's success on the first trial.

Immediate Versus Delayed Reinforcement

The following three studies all tended to confirm the desirability of immediate reinforcement, although their operational definitions of this term are sufficiently different to require separate comment. S. R. Meyer (1960b) compared the effectiveness of programmed textbooks when the correct responses were given to the pupils 24 hours after the initial response to the conventional programmed textbook, in which students could obtain immediate confirmation. The delayed-reinforcement group made almost twice as many errors on the program and scored lower on the criterion test than the immediately reinforced group.

Group-discussion skills were found by Loree and Koch (1960) to be significantly improved through the use of positive reinforcement presented by the experimenter immediately following a reproduction of the response rather than by the subjects' listening to the response itself.

A study by Sax (1960) showed that a delay in providing knowledge of results ranging from 0 to 40 seconds had a significant influence on

the number of trials necessary to associate characteristics of Chinese symbols with nonsense syllables. The longer the delay, the more trials were necessary to obtain the criterion. A check on retention two weeks later, however, revealed that whatever differences initially existed had disappeared.

Schedules of Reinforcement

How often should the learner be reinforced for correct responses? The schedules investigated included the following: (a) continuous, where every response is reinforced; (b) fixed ratio, where every n th response is reinforced; (c) variable ratio, where an average of one in n responses is reinforced irregularly; (d) fixed interval, where the first response after a constant interval since the last response is reinforced; and (e) variable interval, where the first response after some variable (within a specified average) interval since the last response is reinforced.

Consistent rates of responding under each schedule of reinforcement have been noted for some infrahuman species, but experimental tests of various schedules with meaningful human learning have been difficult to devise. In one attempt by Green, Sanders, and Squier (1959), subjects were asked to pull a lever as soon as they could whenever a "correct" pattern of lights appeared. They found that subjects learned to respond to the correct pattern more often under ratios involving more reinforced than unreinforced trials and under schedules with short time intervals.

Generally, continuous reinforcement appears to be superior to various schedules of intermittent reinforcement in acquiring concepts, according to Chansky (1960), Bourne and Pendleton (1958), and Bourne and Haygood (1960). Sax (1960), however, was unable to find a significant difference between a 50 percent variable ratio schedule and a continuous schedule of reinforcement, either on number of trials for acquisition or on retention.

Difficult research problems in scheduling reinforcement are numerous and could have important implications for teachers. Most teachers reveal an implicit awareness of the problem when they often ignore Johnny's continually raised hand, and yet call on shy Susan every time she volunteers. What schedules of reinforcement are most effective with what kinds of pupils? Is continuous reinforcement best for acquiring concepts and skills but some other schedule best for maintaining the response in strength? What schedule of reinforcement will best guarantee that the learner will continue to emit polite phrases, for example, in the absence of the person originally administering the reinforcers? A convenient summary of certain animal research on schedules of reinforcement with suggestive analogies for human behavior appeared in a programed textbook by Holland and Skinner (1961).

Maintaining and Improving the Desired Response

The nature, conditions, amount, and distribution of practice with meaningful material have received little attention during the past three years.

Maier and Hoffman (1960) asked whether a group's second solution to an industrial human relations problem would be superior to its first solution. They found on the average that the second solution was not only more "integrative" but also more acceptable to the group producing it and was completed in two-thirds the time of the first solution.

Practice under variations of whole and part methods was investigated by McGuigan (1960), using one card in the *Kohs Block Design Test*. In general, he found that practicing the task as a whole resulted in significantly faster criterion performance than did various combinations of learning the parts. He interpreted his results under the hypothesis that whole learning is superior largely because it entails distributed practice. A test of this hypothesis could be made by revising his procedure slightly. Instead of asking the subjects to reproduce each quadrant of the card twelve consecutive times as McGuigan did under the part method, subjects could be asked to reproduce separately, but in turn, each of the four quadrants. Subjects would still be learning parts, but would be distributing their practice rather than massing it on any one quadrant. Another procedure for testing the hypothesis would be to allow longer time intervals between trials of the part method to allow reactive inhibition to dissipate.

The problem of distribution of practice has not yet begun to be investigated in programmed learning, although the method is ideally suited to the problem. The spacing of review frames in a programmed learning sequence could easily be manipulated and effects on long-term retention measured. Hypotheses derived from rat studies and nonsense syllable studies could readily be tested with meaningful learning material on human subjects.

Eliminating the Undesired Response

Optimal Error Rate

The controversy about the value of students' errors is far from resolved. Skinner (1958) built a strong case for errorless learning, and Pressey (1960) raised sharp questions about ways students may learn from mistakes. Fruitful research on this important problem can probably resolve the issue as soon as consensus is reached on the criterion behavior desired.

Melaragno (1960) inserted five deliberately ambiguous frames in a 50-frame teaching program and called all responses to these five frames

wrong. Arranging the five frames consecutively in the middle of the program caused significantly lower criterion test performance, particularly on the information taught by the frames immediately preceding and succeeding these frames. When these difficult frames were evenly distributed throughout the program, Melaragno concluded that learning was not disrupted. Acceptance of this conclusion should be tempered by the fact that 9 persons receiving only positive reinforcement scored higher on the criterion test than the 10 persons receiving spaced negative reinforcers, i.e., the difficult frames. The difference was computed to be significant at the 20 percent level by a nonparametric test. Although the author chose to call this difference nonsignificant, a more powerful statistical test or a slightly larger sample size might have led to rejection of the null hypothesis at conventional levels.

Holland and Porter (1960) readministered a criterion test six months after the first administration to 14 students who had completed the Harvard psychology program. The answers that had proved easiest on the first test were not forgotten as often as were the answers to initially more difficult test items. Such results may be interpreted as consistent with the principle that overlearned material is retained better than partially learned material, but they do not necessarily support the authors' claim that a program providing for low error rate leads to greater retention.

Shay (1961) was unable to find any consistent relationship between the difficulty of a program and the score on a criterion test in a study of fourth-grade children learning Roman numerals. This may have been because the actual difficulty levels of the frames in the three programs were not sufficiently different to provide a powerful test of the hypothesis, although the three alternative programs varied greatly in number of steps. One of the major methodological problems in investigating optimal difficulty levels consists of finding a way to produce programs of varying difficulty levels without confounding other variables, such as number of steps or time required. Melaragno's (1960) method of inserting deliberately ambiguous frames provided one promising approach.

Procedures for Dealing with Errors

Student's errors always have been a problem, and the question of what to do with them is particularly vexing with constructed-response programmed material. Although many suggestions have been made, the only experimentally tested method in constructed-response programs has been to repeat incorrectly answered frames. S. R. Meyer (1960b) reported no significant difference on a criterion test between pupils who repeated missed items and those who simply ignored their errors. However, the subjects who were given instructions to repeat any incorrectly answered frames scored 21.0 percent of their errors as correct, in contrast with the nonrepetition group who inaccurately scored only 8.8 percent of their

errors. This significant difference means that the repetition group actually evaded the requirement to correct their errors, probably perceiving it as a *punishing consequence*.

A similar study by Holland and Porter (1960) compared seven college students who repeated incorrectly answered frames with seven who did not repeat frames. They found consistent and significant superiority for the repetition group at all levels of criterion difficulty, although about 10 percent more time was required for the repetition group.

Coulson and Silberman (1960) reported a study by an active group at System Development Corporation, who experimented with multiple-choice programs in which students were routed through the program by a process which depended on the nature of their responses. This process, termed branching, permits appropriate variation of the program to remedy errors, repeat sections, or drop out easy parts, depending on the learner's needs. No significant differences were found at first between branching and nonbranching conditions. A later report of two experiments stated that a program in logic rewritten in paragraph form produced significantly superior criterion performance in comparison with a fixed-sequence program. A simple back-branching method was of intermediate value, according to Silberman and others (1961). The second experiment in this report made use of a more elaborate computer-controlled teaching machine. One group was allowed to branch to remedial items on the basis of its errors, while members of the fixed-sequence group took the same sequence of frames followed by their paired mates in the branching group. No significant difference resulted.

A most recent attempt by Coulson and others (1961) to demonstrate the superiority of a branching procedure over a fixed-sequence procedure was successful, but the special conditions of the experiment favored the branching group. Of some importance is the fact that the sequence of items for the fixed-sequence group was prepared by one independent consultant who made the sole judgment of what constituted an effective instructional sequence. The presumed advantages of branching may exist, but further experimentation will be necessary to specify the exact conditions and techniques most favorable to the branching method.

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